CEMETERIES OF ARMANT I—TEXT

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By SIR ROBERT MOND, LL.D., D.C.L.
AND OLIVER H. MYERS

WITH CHAPTERS BY
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AND OTHER CONTRIBUTIONS

THE TEXT

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PREFACE

The cream has been skimmed off Egyptology and it is almost useless to start an excavation with the idea of discovering easily a mass of new information about the lives of the people or a hoard of treasure suitable for museums. Such things can occasionally be found with luck, but the conscientious excavator must (to continue the metaphor) extract from the skim the proteins and albumens. That this skimming has left much of great value undiscovered no one can doubt who examines the blanks in our knowledge, but to extract the information from everyday finds requires a new technique. In *The Bucheum* we began seeking the methods necessary to fulfil our aim of extracting the utmost information from *all* the material. In this book we have carried it a stage further and have added the statistical method to our armoury. The results we consider have justified us, since material of no outstanding value has yielded information twice that given by more spectacular finds under cursory examination. This method yields results that are cumulative and, if used, it must be applied honestly and fully. This produces results that may perhaps puzzle the reader. For example there is at the end of every chapter a register of the objects dealt with in that chapter. The bulk of the information in the register is of no interest whatever to the ordinary reader, it is put there for the specialist—in the shortest possible form. Moreover, in these registers an object will be seen occasionally to be marked " Lost." Such a remark will seldom, if ever, be found in older publications of excavations. This does not mean that we have been exceptionally careless or unusually unlucky ; it is simply that we have published everything found and given the present situation of each object. Where this is not done it is quite simple to omit reference to any object mislaid, but to do so in what purported to be a complete record would be a negation of the whole method we are endeavouring to employ. Nor have we hesitated to publish the results of a line of enquiry when the enquiry has proved fruitless or of doubtful value, since only by publishing the result can others judge if it be worth abandoning the particular line of research or pursuing it.

If anyone doubt the value of applying statistics to archæology, let him imagine that a site stretching some miles each side of the Nile valley, has been *fully* recorded with all available details of all the tombs and other remains on it. With this information, aided by such help as the documents provide, it would be possible to correlate the rise and fall of wealth and population, with the lengths of the different periods and thus open up a whole new field of information.

Pursuing these aims we have applied to the utmost the principle of seeking expert advice on every point where it could be of value. By the nature of the material, which includes more variety of finds than from the Bucheum, we had to cast our net wider than in the study of that site. In the present volume these contributions have all been placed at the ends of the chapters to which they belong, even when they are only brief identifications, so that the reader who is not interested in the technical side of archæology and who is prepared to accept the results of analysis

may skip the details. At the same time the fullest account has been given of these where they might be of value to future workers. It is perhaps not known to those unfamiliar with chemistry and physics that neither the value of such a report, nor the labour put into it can be judged by its length. Long reports are those in which the methods applied are new and must, therefore, be recorded, but a three-line analysis may have taken ten days to do. The larger part of several chapters which we have edited has been contributed by specialists, but as it would overweight the contents page unduly to insert there the names of the joint authors these are given below. Each section is also signed. It is needless to stress how much the volume owes to all these specialists who have given freely of their time to the solution of our problems. Much is due also to others, whose contributions are not so apparent. First mention must be made of the members of the excavating staff who have not actually written up any of the material, but on whose accuracy and skill depends the value of the results obtained, nor must the native workmen be forgotten, from Ali Mohammed es Suefi to the youngest recruit. We wish to express our gratitude to Miss de la Motte, who has been secretary to the expedition during the writing of this book. She has put unsparing care and labour into the preparation of all the registers and much of the other responsible and arduous routine work which an archæological report requires. Finally, we wish to thank the printers both of the text and plates for the trouble they have taken with a difficult task.

A minor innovation may perhaps be mentioned here. The German word *fundplatz* has been adopted in place of *provenance* which has acquired some ambiguity in English. For example, what is the provenance of some beads now in the Cairo Museum, found at Armant and made in Mesopotamia from Persian stone? They can have but one *fundplatz*, and the word explains itself.

With this volume we have published everything found or bought on the concession from the beginning of excavations there until the summer of 1933. A book, *Temples of Armant, A Preliminary Survey*, is in preparation, dealing with all that we have discovered about Armant from travellers and this will contain a reconstruction of the Temple of Cleopatra at Armant and of most of the scenes portrayed on its walls.

* * * *

The excavation of ordinary *baladi* cemeteries has a charm all its own. It is true that no very startling results are to be expected, nothing which will make a nine days' wonder in the Press, or bring the tourists flocking to the site, but almost every day has its small rewards and prizes. The digger never knows what he may find next. Tombs are often in the most surprising juxtaposition, and even where a cemetery is uniform in date, some new fact about the daily life of an ancient people, bringing them closer to us, is constantly appearing. The big sites bring the big rewards, but they also bring the long stretches of boredom, when there is nothing to do but to cut down through forty or fifty feet of rock in order to make a safe entrance beneath. Moreover, there is a friendly and peaceful air about cemetery work which is lacking in the bigger excavations. The workers are fewer, and, therefore, confined to the better types and the older friends. The *tempo* is more leisurely, because the work demands care and attention, and there is time for the exchange of banter and reminiscence with the men, when cries of "*Fi bakht?*" "*Inshallah! Robni yigib!*" mingle with tales of "*bakshish* I have had." So our regret was not unmingled with feelings of relief when we turned from the huge task of excavating the Bucheum, to the humbler one of "pot-hunting."

Our native staff was strengthened by men trained by Mr. Guy Brunton in this type of work and kindly lent by him, including Reis Ali Mohammed es Suefi, Hofni Ibrahim, Ahmed Ali and others. The foreman made a name for himself in cemetery digging as long ago as 1896, and an appreciation of his work by Professor Petrie will be found on pp. viii to x of *Naqada and Ballas*. All the members of the English staff had gained some experience of the work during the excavation of cemeteries 600 to 900, and everyone took a hand in the field when it was necessary.

CONTRIBUTORS

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C. R. Bailey	Analysis.
T. J. C. Baly	*The Stone Objects* (XVI).
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Prof. C. O. Bannister	Metallurgical analyses.
H. C. Beck	Report on beads.
Miss D. Billington	Pottery descriptions.
Dr. K. G. Blair	Entomological identifications.
L. A. Boodle	Botanical identifications.
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We are indebted for help to Mr. Arthur B. Allen, Mr. H. Braunholz, Dr. L. Chalk, Dr. F. C. Fraser, Prof. J. Garstang, Prof. D. Battiscombe Gunn, Prof. H. A. Harris, Mr. A. Lucas, Dr. Ernest Mackay, Prof. P. E. Newberry, Dr. A. J. Plenderleith, Dr. A. Scott and Mr. M. N. Tod.

We are very grateful for the facilities and assistance given to us at the Musée d'Ethnographie, Palais du Trocadéro, by Messrs. Paul Rivet, Georges Henri Rivière and Harper Kelley, at the Physics laboratories, University College of London, by Prof. E. N. da C. Andrade, and at the Manchester Museum by Miss Mary Shaw.

The following have been kind enough to read different sections of the manuscript and we owe them thanks for many helpful suggestions and corrections :

Mr. Guy Brunton, Mr. Horace C. Beck, Mr. C. H. Donaldson, Miss G. Caton-Thompson, Mr. S. R. K. Glanville, Mr. Hugh Last, Mrs. Oliver H. Myers, Mr. Gerald Wainwright.

INTRODUCTION

In 1926 in company with Mr. Walter Emery I examined the edge of the desert to the west of Armant, searching for the possible site of the Bucheum, and we noticed the existence of many cemeteries dating from Predynastic times upwards. The excavation of the Bucheum and the Baqaria, as described in the volumes of the Bucheum, the forty-first Memoir of the Egypt Exploration Society (1934), absorbed our united efforts for a considerable time, and it was only on the completion of these excavations some five or six years later, that we had an opportunity to turn our attention to a systematic exploration of these cemeteries. The present volume records the results so far obtained. They prove that in spite of the fact that most of the cemeteries have been nearly completely destroyed by robbers, enough material is left to record facts of distinct ethnographic and historical value.

We have pursued our principle of enlisting unblushingly the aid of all those most competent to help us, an assistance which has been most readily accorded and which places us under an ever-increasing obligation, an obligation which we gladly recognise and fully appreciate.

Our work has given us some important new results—really more than could have been anticipated. The discovery of remnants of a culture that is found across Africa as far as Timbuctoo was a pleasant surprise. Predynastic settlements and cemeteries were explored, providing us with the earliest painted textile fabric. Careful examination of the many beads found has taught us the methods of their manufacture, and Mr. Beck has helped us with many points.

The large number of worked flints has enabled us to provide Suliman Huzayyin Effendi with material for an admirable study.

The excavations were again under the direction of Mr. Oliver H. Myers who was ably supported by Messrs. H. W. Fairman, T. J. C. Baly, W. B. K. Shaw and R. N. Lester.

By kind permission of the Senate of the University of Manchester and through the generosity of Sir Henry Wellcome, Dr. J. W. Jackson was enabled to study our human and animal skeletal material on the spot. More than forty contributors have aided us in our task, much of which, like the examination of colours, and methods of painting, required wearisome and difficult analyses ; the very early date of our finds, made every fact that could be ascertained of very great importance. Miss de la Motte ably assisted Mr. Myers in the editorial part. Mr. Baly and Mr. Fairman, who have carefully studied the extant published and unpublished data on the destroyed Temples of Armant, have already succeeded in obtaining sufficient material to make a separate publication advisable, and in the meantime we are endeavouring to enlist co-operation in the search for further published and unpublished notes.

My warmest thanks are due to all those who have so whole-heartedly and generously assisted in our task, and I feel assured that all those who may peruse these pages will feel as gratified with their contributions to knowledge as my fellow workers are content with the results so far attained.

I trust that the new campaign at Armant will yield results of similar importance.

Robert Mond.

CHAPTER I

GENERAL SUMMARY

Of the research work described in detail in the following chapters it may be said that the parts are greater than the whole. The work, which deals mainly with the Predynastic period, has not revealed any startling new historical facts, but it has produced many extremely interesting details which must take an important place in any comprehensive picture of the period.

Before giving the conclusions which we have drawn from the work it is as well to guard against any misunderstanding. In this summary no evidence will be given, since that is all in its appropriate place in the following chapters, but nowhere is anything stated to be a fact unless it is proven. The expressions " it is so," " it is probably so," " we believe that it is so " and " I think that it is so " bear their literal meaning. Full indexing should enable the reader to satisfy himself of the value of any conclusions drawn, by turning to the detailed evidence. The conclusions are given in the chronological order of the part of Egyptian history to which they refer.

Earliest Civilisation.

Scattered over the surface of the concession, pottery has been found which is identical with that recovered at intervals across the Sahara to a point farther west than Timbuctoo. It is probable that these sherds were left by people coming into the Nile valley from the Sahara, and we think that this race entered Egypt earlier than any of the other known civilisations of the valley. At present there is insufficient evidence to prove or disprove this hypothesis.

Should it be possible to date the culture the importance of the discovery would be almost unbounded. Erosion in the Sahara is such that there seems little hope of finding stratified sites there, and workers in that area, who have seen the Armant material, are extremely anxious for it to be dated, so that a starting point can be given to the chronology of the Sahara. The archæological chronology of the Sahara is linked up with the problem of climatic changes, and these are correlated with the sub-pluvial periods, which, in their turn, were caused by movements of the world ice-caps. From this it can be seen that the solving of this problem is of unusual importance, stretching far beyond the confines of Egypt and the Near East. It is no exaggeration to say that these few hundred small broken sherds may ultimately transcend in importance any other single find in Egypt.

Predynastic Period.

Only two sherds of the E.P. II (Tasian)[1] period were found on the concession, both fragments of beaker ware, and no conclusions can be drawn from them.

Three separate areas of remains of the E.P.III (Badarian)[1] period have been found on the

[1] See note on p. 6.

concession, and a fourth since the material which is published in this book was excavated. There is no reason to doubt the date of these remains though the chronology is complicated at Armant, as will be shown, by the survival of elements culturally Badarian in the later Predynastic period. The most important of these remains was a group of sherds found in the bottom of a filled-in wadi bed. The conditions under which these were found indicate a possibility that the E.P.III (Badarian) was a rainy period, and that dessication set in very soon afterwards, though the evidence is unfortunately far from conclusive.

The bulk of the material published dates from Early Predynastic IV to Late Predynastic, and comes partly from a cemetery and partly from a settlement.

The cemetery culture was perfectly normal in its main features, and included most of the types of pottery and other objects commonly found in Middle and Upper Egypt. There were a number of pot forms classed as Nubian in the *Pre. Corpus*, but the wares were quite normal.

The finding of a definitely Asiatic skull in the true Predynastic period is of some considerable importance. Possibly it belonged to a trader who died while visiting the place.

It is suggestive that the skull of the burial (1466), which contained three very unusual gesso objects (possibly model shields), was different from the others. The fact that the nearest comparison is in the skulls of Mesolithic people from Kenya may perhaps be significant.

After finding the cemetery material to be so closely akin to that from Middle Egypt it was surprising to find that a nearby settlement ranging from the E.P.IV to the L.P. periods, while it contained examples of all the normal pottery, had new features in every level. These showed themselves in both the flintwork and the pottery.

The flintwork is quite different from that found at Hemmamieh and appears to belong to a cultural group stretching from Nagʿ Hamâdi in the north an uncertain distance to the south of Armant, and westwards to Khargah. Curiously enough, certain implements have parallels amongst the Badarian implements from Middle Egypt, but their date at Armant is not known, and they may belong to that (the E.P.III) period. A few tranché adzes of E.P. II (Tasian) date from near Mostagedda, resemble implements typical of the Armant culture, but it is too early as yet to correlate the two. Suliman Huzayyin, in his admirably detailed study of the flints, discusses all the possibilities and points out that, in so far as the flints are concerned, Armant was slow to fall under the northern influence of the Middle Predynastic, and that Upper Egypt developed its own tradition until the Late Predynastic period. In this connection it is perhaps worth noticing that according to an analysis of the beads (though of too small a number of strings to be at all conclusive), the cemeteries of the area show a lag of about five sequence dates in development compared with Middle Egypt.

Some of the implements appear to have been made outside the settlement, and Huzayyin suggests as a possibility that the station found by Ed. Vignard at Nagʿ Hamâdi, and described by him as an Aurignacian site, may in fact, have been the manufactory for some of the typical implements of this culture. Details of a Predynastic route across the desert from Armant to Nagʿ Hamâdi are now being investigated.

Side by side with this difference in flint work from other settlements, we find at Armant a difference in the settlement pottery, though it is as yet impossible to correlate the new wares with those from any other site, but then Hemmamieh is the only Upper Egyptian settlement from which we have a detailed record of the pottery.

Evenly distributed throughout the whole period at Armant we find a type of pottery with

point-burnished decoration on the inside, similar to, but coarser than that found on the Badarian. No specimen of this was found in the cemetery. (It should be pointed out that the cemetery excavated was about a mile from the settlement, and was the burying ground for a different village. The cemetery attached to settlement 1,000 to 1,100 has been destroyed by later graves.)

Throughout the whole period of the settlement from S.D. 35 to 78+(or at least to S.D. 57, the beginning of the top level), certain types of Badarian wares were found, especially the " Smooth Brown," " Black-topped Brown " and keeled wares. The percentage of these sherds to the whole of the identifiable material steadily decreases. It seems to show that the changes in potting which took place at the beginning of the E.P.IV (Early Predynastic) period were slow to spread to the cheaper wares for domestic use, perhaps because these were of local manufacture, and it is important to notice that the Badarian wares from Armant differ from those from Middle Egypt (of the E.P.III period) in that they are thicker and coarser. If this hypothesis is correct, it follows that only the more expensive pots were buried in tombs, and that the normal Predynastic wares found in the settlement belonged to the wealthier inhabitants. The difficulty in accepting this hypothesis is the constant recurrence of " Rough " pots in the graves, and the low percentage of Badarian types in the settlement : 29, 20, 11 from the lowest level upwards. The only other hypothesis which suggests itself is that the settlement 1000–1100 is different culturally, though chronologically the same as cemetery 1400–1500 ; but such a cultural change in a distance of about a mile is not very probable.

Protodynastic.

Two large Protodynastic tombs published are of great interest, both on account of their evident original wealth, and the fact that they were both metric and, though of the same date, almost certainly constructed with different units of length, one with a short Royal cubit, and one with the so-called Persian or Sacred Hebrew cubit. In another, smaller grave Mesopotamian influence is possibly shown in the glazing of two beads.

Old Kingdom and First Intermediate.

Again some beads appear to be of a Mesopotamian type and these belong, almost certainly, to the Old Kingdom. In the same string are some artificial glass beads, the discovery of which sets back the beginning of the glass industry.

Middle Kingdom.

In two large robbed tombs of this period some clear glass beads were found, probably belonging to the tomb. The dating was difficult in these tombs as the pottery did not appear to be quite concordant and we think it likely that the tombs were family vaults surviving throughout the period. A number of uninscribed pottery cones and the pottery offering tables peculiar to the area and the period were found.

INDIVIDUAL OBJECTS

We think that it may be of value to readers to give, in addition to the above sketch of the historical implications of the excavations, very brief notes of important individual discoveries, and the other matters of interest which are discussed fully throughout the book. These notes

are arranged by chapters, and are intended to serve the same purpose as the contents of chapters frequently included in older books and invented by Alfred the Great,[1] but the list is not complete, for it is only meant to draw attention to the more important sections.

1—The Cemeteries.

II. *The Tombs and the Excavation.* Indications of a wet E.P.III (Badarian) period and desiccation rapidly setting in. Galena and limonite as cosmetics in the Predynastic period. Dating of Old Kingdom burials with coffin text and glass beads.

III. *Stone Objects.* Predynastic gypsum vase. Stone hippopotami. Was the hippopotamus domesticated by the Predynastic people? Altered gabbro used in Protodynastic times. Middle Kingdom stela and statuette.

IV. *Pottery.* A new typology for Predynastic period and a new corpus suggested. Simple proportions of " White cross line " pots. Method of dating new types. Decoration of Middle Kingdom pottery classified separately from pots. Contents of pots classified with dates. Cleaning salts out of pots, a new method.

V. *Beads.* Classification : suggestion for a combination of Beck's and Brunton's methods. Materials : Green and yellow fluorspar, wood opal, glazed serpentine, glazed carnelian, amber, bitumen or ozokerite, beetle thoraxes and femora, all in Predynastic period. Glass in the Old Kingdom and Middle Kingdom ; possibilities of determination by specific gravity and refractive index. Colour, recording of. Manufacture : turning on bow drill, finish of surface, perforation and finish of same. Apparatus and materials used in manufacture. Wear. Examinations and analyses.

VI. *Metal.* Predynastic copper bangles. Protodynastic copper tools. Middle Kingdom copper mirror. Mirrors concave and convex in Ancient Egypt. Analyses.

VII. *Gesso Objects.* Predynastic painted gesso. Made by hydraulicking? Red ochre and carbon paints. Analyses.

VIII. *Miscellaneous Objects.* Predynastic sewn gazelle-skin garment : needles finer than No. 10 size? Feather head-(?) dress. Bags for cosmetics. Hippopotamus ivory. Beds : with canopy? Botanical identifications, examination of fabrics, analyses of plaster and cosmetics.

IX. *The Osteology.* Unusual skull from 1466. Alien Asiatic skull from 1487. Full comparative tables of skull and limb measurements, comparisons with other sites.

X. *The Pathology.* Skeleton of a Predynastic eunuch. Abnormal and diseased bones.

2—The Settlement.

XI. *Excavation.* General conditions. Description of plans.

[1] Edward Conybeare, *Alfred in the Chroniclers*, p. 58, §18. London, 1900.

XII. *The Pottery.* Badarian wares. Point-burnished wares. The levels sequence-dated from the sherds by statistical method. Preponderence of bulls among pottery figurines. Technical examination of sherds ; high firing temperatures. Analyses of wares and paints. Colours.

XIII. *Miscellaneous Objects.* Absence of beads.

XIV. *The Flint Industry.* Summary of results at all other Predynastic settlements. Method of classification. Description of each class. Conclusions : the local flint culture linked up with Nagʿ Hamâdi and Khargah, not with Middle Egypt. Description of each figured implement. Bibliography.

XV. *The Osteology.* Ox, sheep, pig and turtle eaten. Comparison with other sites.

3—Miscellaneous.

XVI. *Stone Objects.* Series of Coptic tombstones.

XVII. *A Saharan Culture.* Early date? Comparative material 2,600 miles away. Technical description of wares. Some physical tests : apparent porosity, absorption speed. Analyses.

XVIII. *A New Pottery.* A Nubian intrusion.

XIX. *Ostraka.* Mention of the Bucheum.

XX. *Some Coptic Manuscripts.* Summary list.

O. H. M.

PART I

CHAPTER II

THE TOMBS AND THEIR EXCAVATION

THE three main excavations were carried out in areas 1300, 1400–1500, and in and around tombs 1213 and 1214. It should be explained that 1200 is not, like other 100 numbers, an area, but numbers 1201–1299 have been reserved for all tombs which were dug as a trial in various parts of the concession. Thus two Protodynastic tombs on the southern edge of a large Old Kingdom cemetery, to the east of the house and immediately north of the cultivation, which has not yet been further excavated, are numbered 1207 and 1208. Grave 1209 was a little to the east of cemetery 1300, and 1211 and 1212 in the middle of the area subsequently numbered 1400–1500. Area 1300 produced a mixed bag of tombs, extending from the Late Predynastic to the Late New Kingdom, 1400–1500 was almost purely Predynastic, with but a trace of Coptic interference, while tombs 1213 and 1214 dated to the Middle Kingdom.

THE EARLY PREDYNASTIC III PERIOD.

Grave 1209A has been dated to the E.P.III[1] (Badarian) period, but the evidence is not conclusive. The head was E.N.E. and the body was lying on its left side. Orientation is very insecure at Armant on account of the bend in the river. The local inhabitants never seem to have been able to decide whether to use true north and south or local north and south.[2] There were some matting and some unrippled sherds, apparently " smooth-brown " ware, and unlike any found in the later Predynastic graves. Nearby, in a hole in the desert surface 1209B, was found the undoubtedly E.P.III (Badarian) pot, BB 19 k (Pl. XXIII). The skeleton of 1209A

[1] Throughout this book, while Late Predynastic and Middle Predynastic have been used in the generally accepted sense, Early Predynastic has been split into four subdivisions, Early Predynastic IV (E.P.IV) for the period usually called Early Predynastic, E.P.III for that usually called Badarian, and E.P.II for that called Tasian, or Merimde-Beni-Salame, according to its locality. E.P.I is left blank for any culture earlier than E.P.II. Throughout, the old terms have been retained in brackets after the new. The old terms, when used without brackets, refer to the culture and not the date. This step appears to us to be absolutely necessary for two reasons : the naming of a period by the place in which its culture was first found is most misleading and unscientific, and there may be no relation to the origin of the culture and its subsequent distribution, besides adding an unnecessary difficulty in the way of students ; secondly, endless confusion arises when, as at Armant, the same culture appears at two dates. To differentiate the cultures of the different districts, M.E. (Middle Egyptian), U.E. (Upper Egyptian), etc., can easily be added.

The terms *Énéolithique I* and *Énéolithique II* are much used in France for what we have called E.P.II and E. III. To justify our action in not adopting these, it is sufficient to quote Larousse, *Dictionnaire d'Art et d'Archéologie*, Paris, 1930 :—" *Énéolithique* (Période).—Expression hybride (formée du mot latin *æneus*, d'airain, et du mot grec *lithos*, pierre), pour designer, assez improprement d'ailleurs, l'age du cuivre, phase intermediaire entre l'âge de la pierre polie et l'âge du bronze. L'usage s'est établi d'écrire, à l'exemple des palethnologues italiens qui ont forgé cette expression, *énéolithique* plutôt qu'ænéolithique. It. *eneolitico ;* all. *Kupferzeit*."

We suggest that the term Protodynastic should be used only for the part of the Late Predynastic occupied by the dynasties which precede Dynasty I, and that these should be numbered as Protodynasties.

[2] See p. 10.

was that of a woman, and in the pelvis area were found some fœtal bones. Professor H. A. Harris reports that the bones are of a human fœtus of about seven months ; they are now in the anatomy museum at University College. On. p. 138 Mr. Boodle reports on some vegetable remains found under the pot BB 19 k, which proved to be Durra millet. Their fresh condition led to the belief that they were brought in by a mouse, but as there was no sign of a suitable cavity it is possible that they were contemporary.

In all parts of the concession were found the remains of large trees, which at one time grew sparsely over the Low Desert at a height of twenty or more feet above the present cultivation level, and, if the rise of the Nile since Predynastic times has been consistently that calculated by M. Legrain (nearly one yard every 1,000 years), 40 feet above the cultivation level at that date. These trees were first recorded, so far as I am aware, by Mr. Brunton at Qau. When we found them at Armant, we questioned the men, and they averred that they were to be found in every part of the Nile valley, but that they had never been asked to preserve them before. A fine example of one of these trees is shown in Fig. 1 of Pl. VIII. The metre rod is resting on the surface of the ground, and it can be seen that the surface has been eroded, for the roots do not meet, and the trunk has completely disappeared. A part of one of the roots was sent to Kew Gardens and Sir Arthur W. Hill has reported upon it as follows : " The specimen of wood received for identification appears to be that of *Ficus Sycamorus*, although from its indifferent state of preservation, it is not possible to identify it with any degree of certainty." This particular specimen was found in the neighbourhood of the Bucheum. Another tree from the same neighbourhood has been identified by Dr. L. Chalk of the Imperial Forestry Institute, as acacia, but the species cannot be defined.

It is very difficult to get any clear proof of the date of these trees. It has been surmised that they were contemporary with the E.P.III (Badarian) period. The Middle Egyptian settlements of this period were often found well back from the cultivation edge, by the sides of wadis, indicating that the wadis were running streams at that date, or at least partially supplied with water like the Wadi Ghuzzeh at the present day. One of these trees was found at Musta Gedda with a squatter's remains apparently in its shade, though there was no proof that the association was not fortuitous. At Armant it has not been possible to settle the problem definitely, but a step forward has been made.

In cemetery 1400–1500 some of the Predynastic graves (both M.P. and L.P.) had been cut through the roots of such trees. The evidence for this was perfectly clear, the root being present in the native rock each side of the tomb and absent in the filling. Thus the trees cannot be later than the Predynastic period.

Further interesting evidence was forthcoming in a small silted-up wadi near tomb 1213. One gang of men started clearing along this stream bed, under the impression that it was a tomb entrance. As it was the end of the season, and there was no room for the men in the two tombs being excavated, they were allowed to continue for two or three days, to see if anything of interest was found. In Fig. 2 of Pl. VIII the stratification of the silt can be seen running over tomb 1213. It was not possible to show in the photograph that the filling was present before the tomb was cut, but this was nevertheless the case. The roof part of the tomb, visible in the bottom right-hand corner of the photograph, is less than 50 cm. below the bottom of the bed of the wadi, whereas, had the wadi been empty when the tomb was first excavated, greater depth of roof would have been left. This means that the bed was filled before the second millennium B.C.

A general view of the excavated stream bed is given in Fig. 3. A metre rod about half-way along on the right-hand side gives the scale. (The rod is in the same position as in Fig. 5.)

Fig. 4 is a close-up of the section through the filling, which, according to Suliman Huzayyin, Effendi is water laid, and was probably deposited by a series of storms.

Fig. 5 shows part of the bank. The pale-coloured material is the native rock through which the stream cut its course, and the darker material is the filling. When cleaned, the entire walls were seen to be rock, and tomb excavation nearby also showed that this was the native soil. To the left of the metre rod is an oval hole in the filling, and about 5 cm. to the left of it is a smaller oval brown patch. Both these represent the roots of trees growing in the filling of the wadi, the larger one having been removed before the photograph was taken, and the smaller being still intact. They were both in the same state of desiccated powder as other tree roots on the Low Desert. This tree must obviously have grown since the bed was at least half filled.

At the bottom of the filling of the wadi, within 2 cm. of native rock, were found several E.P.III (Badarian) sherds, a few of them rippled. There was no doubt either of the date of the sherds or their position, nor was the stratification disturbed above them.

Now, the position of tombs 1213 and 1214 can be seen on the map on Pl. II to be far from the cliff edge. Therefore such a small wadi must have had its beginnings in the Low Desert itself, and must have been cut during a wet period, for it is improbable that the short period torrential downpours of modern times would cut a bed through the hard clay unless they had the impetus from the cliffs behind them, and even then they could hardly do so. There being no reason to suppose any change in conditions in historic times, which could cause a dry wadi, which had remained empty since the last sub-pluvial, suddenly to fill, the only remaining conclusion is that the E.P.III (Badarian) sherds must have been deposited during, or at the immediate end of, the last wet period. The use of the stream for filling pots would seem to be the most likely reason for their presence.

To summarise the evidence, there is a dried stream bed which was filled to the top by the Middle Kingdom and was empty in the E.P.III (Badarian) period. The filling was formed by water action. After the bed was more than half full, a tree grew in the filling. The remains of this tree were in the same state as the other remains of similar trees on the Low Desert. Such trees can be shown to be prior or contemporary with the M.P. (Middle Predynastic) period. From this it would seem possible to deduce that desiccation took place between the E.P.III (Badarian) and historic periods, there still being sufficient moisture on the Low Desert to support trees some time considerably subsequent to the E.P.III. There is, however, one flaw in this argument. The height above present cultivation level of the surface through which the wadi ran is only about 8 feet and trees now grow within 200 yards of it, about 6 feet lower down. But the tree can hardly be modern, on account of its decayed condition (unless the decay be attributed to termites), and the older it is the higher it must have been above Nile level, according to the accepted theory. Some of the tombs in the Bucheum were completely submerged, even in the dry season, showing that there must have been a considerable rise in water level in this neighbourhood since Græco-Roman times, but the problem is otherwise difficult, and we hope it may be settled when the report of the Oriental Institute of Chicago's Prehistoric Survey Expedition appears in full. Meanwhile, if the evidence of the tree be set aside, as too uncertain for acceptance until confirmed, the small excavation in the wadi has more than repaid itself by the light it throws on conditions in the E.P.III (Badarian) period.

The Tomb Registers.

The tomb registers are arranged similarly to those in the series of publications dealing with Qau and Badari, and the essential details of each burial are given in them. The only important differences between the register of Predynastic tombs and that in *Badarian Civilization* are that the body attitudes are given in the present volume and the beads are indicated only by a tick. For a description of what has been done in relation to the body attitudes, see p. 10. The beads are so fully registered on pp. 101–116 that it has been thought sufficient to indicate their presence in the tomb registers.

The differences between the later registers and those in *Qau and Badari II* are not of great importance.

The Early Predynastic IV to Late Predynastic cemeteries.

All the graves of these periods will be discussed together under the general heading "Predynastic," as there is no very hard and fast dividing line between them.

The bulk of the material of this period comes from the cemetery 1400–1500, which was undiluted with graves of any other date, with the exception of a few Coptic tombs which had been completely cleared by robbers. The cemetery had been disturbed in recent times and the "White Cross line" pots published on Pls. XXVII and XXVIII were bought from the robbers during the first season's work at Armant. A little below the cemetery S.E. by S. is a settlement of the same date, which is, no doubt, the village to which the cemetery belonged. This has not yet been dug, and was not actually discovered until the work on the cemetery was in progress. It will be valuable to excavate it and to compare the tomb and settlement material of the same people. All the graves in the cemetery were recorded, with the exception of a few that were quite empty. If we were digging it again we should record these also for their statistical value, but we did not know when we began that we were going to find the whole Predynastic period represented, nor the settlement of those who owned the cemetery—this was a lesson that everything should be recorded, even if at the time it does not seem to be of any value.

Generally speaking, the earlier tombs were rough ovals and the later tombs rectangular, while the earlier part of the cemetery was lower down the spur. Five of the rectangular type of tomb had a loculus on the south side. The loculus is sometimes curved and sometimes rectangular, and is usually about 20 cm. in height. In tomb 1534 (S.D. 63–66), rather than a loculus on the south, there was a shelf on the north, the loculus being larger than the tomb (170 × 100 as against 170 × 60). The loculus is, of course, the forerunner of the separate chamber, leading off a tomb shaft, which is introduced in the Second Dynasty. 1350 (Proto.) had a loculus 120 × 70 × 65, the increased height showing a tendency towards a separate chamber. The dates of the Predynastic loculi are as follows: S.Ds. 39–61 (1540), 63–66 (1534), 60–73 (1512), 52–76 (1545), 76–77 (1590), so the date of the introduction was probably about S.D. 60.

It is not to be expected that simple graves of one chamber only, hewn into the native soil, would be made to measure. Even if they were so, the crumbling nature of the soil, and its lack of homogeneity, makes it impossible to measure them with a degree of accuracy sufficient for inductions to be made. An attempt was made with the rectangular tombs to see if a rough unit could be found, but this was definitely absent, and the same result was obtained from similar graves referred to in the publications of other cemeteries. The only possible metric objects in

the Predynastic tombs were the bed in 1511, and the bed or hamper in 1466. Nothing could be obtained from the former. In the latter, though the measurements must be regarded with caution, there was a possible unit of about 2 cm. It cannot be stated more accurately, because objects could be measured only to the nearest centimetre or half-centimetre. This unit *might* be a large natural digit.

The attitudes of the bodies of all periods are shown on Pl. XII. These have been classified and arranged according to the system worked out by Mr. and Mrs. Brunton in *Qau and Badari I*, Pl. XXV, pp. 18 and 19. The meaning of the symbols in the present series is the same as in that publication, and the meaning of the new middle letters is as follows : In position 2, C means that the angle of the tibia with the femur at the knee is more than 45° ; D that the head is turned back to front ; G that one thigh is at right-angles : in position 3, B means that the knee joint is over 45° ; K that the knees are together and the feet apart : in position 5, L means that the knee joint is less than 45°. In position 8, the numbers 12 and 13 indicate respectively that the hands are crossed on the chest, and that one hand is on the chest and one on the pelvis. In *Qau and Badari I*, the figure 1, referring to the hands position, is omitted. We have inserted it here to distinguish in the register more clearly between those bodies in which the hands position is 1, and those in which the hands are missing, written with a ?. Throughout the register the position of remaining parts of disturbed bodies is given, a query taking the place of the missing information. Thus 3B?′′′′ means that the position of the body was determinable except for the hands, 3??′′ that only the angle of the spine with the femur and the azimuth could be determined, and so forth. In order to facilitate reference, all the different positions are reproduced on Pl. XII, including those which vary only in azimuth.

The most notable feature of the positions at Armant is the orientation, head west or local south being the most favoured position. This raises an interesting point. Where the river runs north and south, the orientation of almost all graves of the periods here considered is north and south, and, where the river bends, the orientation is erratic, but, especially at early periods, tending to be east and west, which are generally referred to as local north and south. The use of this term implies that the people orientated their graves according to the sun and moon, but followed the course of the river as a convenient guide, thinking of it as always running north and getting muddled where it changed direction. This is sound enough for a modern mind, thinking in terms of maps, or even for later Dynastic times in Egypt, when travel must have become more extensive, but, though there were undoubtedly ships and trade in the Predynastic period, it is surely unlikely that the majority of the population of Armant (assuming the sextons to be representative) travelled so extensively that they were less familiar with the points of the compass in their own neighbourhood than elsewhere ! An alternative solution is that the burials were unrelated to the sun, and intended to be parallel to the river, the bodies lying in the direction of the flow of the water. Whatever the explanation, it is unreasonable to believe that the whole population was so hypnotised by the Nile that in all their lives they could not observe the position of the sun within 90°. It is worth noting that the modern Egyptian word for north, *bahari*, means the direction of the flow of the river, and is not related to the sun.

It should be remembered that in the system here used the positions are formalised into north, south, east or west, and that the nearest cardinal point is taken in each case ; thus, where the azimuth of a body is 224°, it is classified as head south, but, where it is 226°, as head west. Now, at Armant, in the majority of burials the head pointed west-south-west, so that an occasional

body orientated slightly more to the south gives an apparently complete change of position in the register.

There are hardly enough dated burials to obtain from their positions alone any valuable data as to the changes which took place, but the following are given for what they are worth :

Positions of legs :	2,	5 at 44–57	arms :	1,	8 at 43–56
	3,	9 at 56–58		2,	10 at 57–61
		2 at 38			2 at 38–42
	4,	4 at 38–46			1 at 79–80
		1 at 79–80		4,	1 at 36–61
	5,	2 at 46–47			

The earliest date in the Predynastic period is to be expected for position 4 of the legs (thigh at right-angles to spine), but this is followed by 2 (30°) instead of the more logical 3 (60°). The positions of the hands appear to progress, 1 (hands at face) appearing to be earlier than 2 (hands apart but raised). In the First Intermediate period, Brunton found 2 a rare position, but in the Predynastic period at Armant it was the commonest. This difference may arise simply through typing, since wherever the hands were not strictly at the face, we described the position as 2 rather than 1, even though the hands themselves were together—there being no number for hands together and not at face.

The positions on Pl. XII are formalised according to the scheme of the corpus.

Positions of Bodies in Graves.

On Pl. LI are drawings of a number of unrobbed graves giving the relative positions of the objects. The drawings are diagrammatic and are intended to show only the relative position of the objects though they are all as nearly as possible to scale.

In a few graves it was found simpler, and just as clear, to describe the positions of the one or two pots which they contained. Below is a list of the graves, with pot positions.

Grave	*Azimuth*	*Object*	*Position*
1452	250	Pot B74a	In N.W. corner of grave. (N.W. of head.)
1455	300	„ B35a	To the N. of face.
1459	215	Slate 91P1	Immediately to N.W. of head.
„	„	Pot B74c	To N.W. of head.
1471	305	Basket	Over hand.
„	„	Pot B57b1	N.E. of basket.
1486	285	„ „	N. of face.
„	„	„ P24n	N. of elbows.
1502	276	„ B57b	N. of face.
„	„	„ B62a	„ „ „
1310N	320	„ 4S1	At W. of head.
„	„	„ 90S1	„ „ „
1314	55	„ 69G	Outside coffin E.N.E. of head.
„	„	„ 8M	„ „ E.S.E. „ „
1330	230	„ 77K	Outside centre of coffin to S. (Opposite hands.)

The positions of objects in partially robbed graves, though they may be used as evidence with caution, are insufficiently certain to justify special illustrations. They are referred to in the descriptions of the individual graves. Graves without objects, or those in which the only object was a coffin, have not been drawn.

Wrappings.

There was a marked decline in the use of matting at about S.D. 56. It was found in 9 per

cent (3 in 33) of the graves dated S.D. 56 onwards, and in 55 per cent (18 in 35) of the graves finishing at S.D. 55 or earlier. This does not include any graves whose dates extend each side of 56. Brunton found (*Bad. Civ.* 53) 27 per cent with matting up to S.D. 49, excluding E.P. III (Badarian), and 20 per cent from that date onwards, with a pronounced falling off after S.D. 70. He records that the matting was not placed underneath the body except in the E.P.III (Badarian) period, but at Armant the custom was practised occasionally throughout the Predynastic period.

Skins were found in only two graves 1475 and 1483, neither of which is Sequence-dated. A description of the gazelle skin dress from 1483 will be found on p. 133. At Qau (*Bad. Civ.*, p. 53) skins were found in three graves, one dated 58–60.

Fabrics were seldom found, but this is not significant, since the state of preservation of such materials at Armant was always indifferent. It was noted in 1466 (38–48), 1472 (38–61), 1510 (43–46), 1511 (41–66) and 1595.

Cosmetics.

Malachite was found in the following graves : 1411 (42–44), 1424, 1427 (34–42), 1443, 1446 (42–67), 1464 (55–65), 1466 (38–48), 1481 (37), 1571 (44–61), and 1312 (79–80), thus showing the wide distribution in time usual for this material. Galena was found twice, in 1466 (38–48) and in 1312 (79–80). Petrie (*Pre. Egypt*, p. 43) claims that this material does not appear till later (about S.D. 70) and so does Lucas (*Anc. Eg. Mat. & Ind.*, p. 80) referring to Petrie (*op. cit.*) Brunton (*Bad. Civ.*), but in the tomb register of the latter work galena is shown as occurring at 35–37 and 39–44. Resin occurs twice at Armant in 1429 and in 1466. In the latter grave was found the solitary example of rouge (red ochre or hæmatite) discovered during the season, and the slate palette from this tomb was stained red. Limonite was found in 1547 (48–63) and we believe that this is the first time that this mineral has been identified from a Predynastic tomb (see p. 141).

Animal Remains.

Gazelle bones were found in four graves, 1466 (38–48), 1518 (75–77), 1529A, and 1583 (65–77). Bones of a jerboa were found in 1451 and remains of small mammals in 1536 (52–66) and 1537, but these may well have been intrusive.

Notes on Individual Tombs.[1]

1327 The four pots were laid against the side of the legs.
1339 (See Pl. LI.)
1344 The pottery was above the body.
1348 Flint between the tibia and the femur. Pot, L36w, N. of face.
1370 Beads round the forehead. See Pl. LI for the positions of the pots.
1401 Slate between forearm and upper arm.
1402 Slate and pebble between the body remains, and the pottery opposite the stomach. Pots along side of grave facing body, from E. to W., B1b, B75b, B77a, B76a, P11c.
1403 Shell by knees. Pot B77a in N.W. corner of grave.

[1] The points of the compass given are not the actual directions, but the directions in relation to the formal azimuth of the body. Thus a body with the azimuth 230° is classed as " head west " and objects to the N.W. of it are given as N. of it.

1405 Slate behind small of back at E.
1406 Pots opposite arms on S. of tomb, from E. to W., B74b, B74a.
1408 Pot R1a inside L53q.
1411 (See Pl. LI.)
1412 Pots at N. of tomb (N.W.), B55b opposite head, P22a opposite knees.
1417 B19a opposite face of burial A at S. of tomb.
1420 Pots at W. end of grave ; unidentified animal bones at S., opposite chest. Matting over body.
1423 (See Pl. LI.)
1424 Beads, a over forehead, b from behind eye socket round back of head, c between jaw and lower part of skull, d under head probably attached to c. (See Pl. LI.)
1428 (See Pl. LI.)
1429 Pot B251 to the W. of head.
1432 (See Pl. LI.)
1433 Pot B74b opposite legs on E.
1435 (See Pl. LI.) Both bodies covered in matting.
1446 Bag of malachite folded into matting.
1449 Pots R92 (2) and R93c to N.W., B61a opposite arms on N., B74a opposite feet to W. of head. Matting over body.
1452 Pot B74a to N.W. of head.
1455 Pot 35a to the N. of head.
1457 Fishtail flint lying on triangular piece of sandstone, and bone comb beneath this. (Possibly all disturbed.)
1459 Slate resting against S.W. of head and pot B74c to S.W. of slate. Matting over body.
1460 Pot B74a to N. of head.
1462 Beads on right wrist.
1466 Although this tomb was robbed, a drawing of the position of all the objects, in the position in which they were found, is given on Pl. LXVII. The tomb was an important and unusual one, and though the robbing was severe, and had certainly removed any objects of spectacular value, such as might have been found at the head and hands, much remained of the greatest interest. The three gesso objects, C, D, and S are discussed in full on pp. 121 to 132. The gypsum vase contained some organic remains which have been reported on by Professor Hilditch on p. 141, and the remains of what appeared to be a bed are described on p. 135. There can be little doubt that the burial was that of an important person, perhaps the chief of a tribe or the " omda " of the local village. The raising of the gesso objects took three days, and they were preserved by slow saturation in a 2 per cent solution of celluloid in acetone and amyl acetate, a stronger solution being used for the final coats.
1467 Pot 62b2 to N. of head.
1468 Pots at N. of tomb. Against wall at E., P95b, at W., B44x, S. of these from E. to W. B37b, W43b, R84t, W43b (2).
1471 Basket over hand and pot B57b1 to N.E. of basket. Matting over and under body.
1472 Pots B57b to W. of head, B55b to N.W. of head, B69a opposite arms, P23a opposite knees, both N.

1473 Matting over and under body like layers of unwoven grass. (See Pl. LI.)
1475 Matting over and under body and skin over body.
1477 The body was that of a eunuch (see Pl. LI), the earliest recorded example. It seems probable that the condition, if not pathological, was the result of an accident, possibly in warfare, rather than of deliberate mutilation. Matting over and under body.
1483 Gazelle skin covering body and wrapped round feet. Linen on top of bones.
1486 Pots B57b1 N. of head and P24n N. of elbows. Matting under body.
1492 Pot L12d inside R81 in N.W. corner of tomb.
1494 Remains of wooden lining of tomb.
1496 Against W. end of tomb, N. to S., pots R91a, R81, R69b, R94h, R94p.
1498 Pottery against N. side of tomb from E. to W., P40b1, R84e, R84d, R81, and a second row P24p, P23c, at end S. wall P24g.
1502 Pots B57b and B62a N. of head. Beads around neck.
1510 Pots R85s, B78c, and P24g to N.W. of head. (Reading from W. to N.) Two ivory combs between knee and body near knee. On floor of tomb linen and matting and at sides sticks and matting, probably a sarir.
1511 Remains of a wooden frame bed described on p. 135 (see Pl. IX, Fig. 2). From N. to S. pots B53a, P45b1, and R84e at W. of tomb, R81 (2) at foot of bed, P23b at S. side of tomb opposite chest.
1512 Pots R65c and P40g1 at centre of W. side of tomb, W47m at S.W. corner of tomb, W47m, R84c and R84d at the centre of N. side of tomb.
1514 Pots R33b, P23c and P93b at the centre of N. side of tomb, B53d, B38c1, W43g, and R65b at W. side of tomb, from N. to S.
1517 Pots R81 (2) and P23b at E. side of tomb. Basket over one R81. (See Pl. IX, Fig. 4.) Some matting longitudinally and toes inside this.
1518 Roughly two rows of pots along N. side of tomb as follows from E. to W. L30g (5), L36n, P45c, L36n, L30g, P24r, L30g (3) and R23b. Gazelle bones over last L30g.
1519 Pots L16b and L7b at N.W. corner of tomb, R81f (2), R65c, R84e (2) at N. side of tomb, reading from W. to E.
1520 Remains of corner and top of sarir composed of sticks bound with string and grass at N.W. corner of tomb. Remains of wood under bed. Pots B53f and R66m at W. side of tomb, B57b1 at centre of S. side of tomb. (See Pl. IX, Fig. 1.)
1523 Pots R81 (4) at S.E. corner, R94h at S.W. corner. Fishtail flint at centre of N. side of tomb.
1525 Pots R84d, R34a, R84e, R22b, L7b, and R81 at S.W. corner of tomb, R81 (2) at N.W. corner of tomb, R81 at N.E. corner of tomb.
1529A Gazelle at foot of body. Matting over and under body. Length of hide under backbone.
1529B Matting over and under body. Was under burial A.
1530 Two rows of pots at E. side of tomb as follows : from N. to S. R84d (2), R81, R84d, R81, R84d, R81, R84d, P24m.
1531 Pots R81 (2) at S.E. corner of tomb. Slate palette at centre of S. side of tomb.
1532 Pots B57a, R81, B42b, P24m, B68b and R66p along S. side of tomb from E. to W., B42b being inside P24m.
1533 Bones wrapped in matting in S.E. corner of tomb.

1534 Pots B29c at N. side of tomb, B29c, W19, and P38 disturbed.
1535 Pots P1b3 inside R81 at S.E. corner of tomb, R81 at S. side of tomb, R92 at S. side of tomb opposite knees.
1536 Pots P44a and W19 at E. side of tomb. Three hammer stones at N. side of tomb. Small mammal bones at centre of S. side of tomb.
1538 Pots R92 at N. side at back of head, P24m and D34 disturbed.
1539 W. end of tomb, S. to N. B50, P95b, R81 and P40e.
1540 All the remains in loculus.
1541 Pots R26c in N.W. corner of tomb, R94 in centre of W. side of tomb, R84e, R84h, R84e, R84h across W. end of tomb from S. to N., B39b1 at S. side of tomb, B39b, R84h, B35d, B38a, W27, W19, R69b (3) in N.E. corner of tomb. Polishing stone on top of first R84e.
1542 Pots R84h (3), R22a in N.W. corner of tomb, R84h, R22a (2), R3c, W43b, W24 (2) and 3 pottery hands in S.E. corner.
1543 Pot R42c in N.E. corner of grave.
1544 Pots R91c, B19c (2), R34a, B21d, R3a in S.E. corner of tomb.
1545 (See Pl. LI.)
1547 Fragments of copper bangles probably contemporary with all the other remains which were Predynastic.
1548 Pots D1m, P24k, R23c, R84g (2), R94k in N.W. corner of tomb, R81 (3) at E. side of tomb.
1550 Pots W19 (2), P24m, R23b, R81, P40e, along E. side of tomb from N. to S., D31, P24n, R66p (2) and the stone vessel disturbed. Pebbles beside first W19.
1551 Pots R81 (2) at W. side of tomb.
1553 Pots B53a in N.E. corner of tomb, P23a, R81 at centre of E. side of tomb.
1557 Pots L30m (2), R65c against N. side of tomb, L30m (4), L36n, L36s, L30m against first pots, R24a over mouth of L36s, R26e over mouth of last L30m, L7c, R65b, R45c, R45a disturbed.
1558 Pots W41 at W. side of tomb, L30b (4) against N. side of tomb, W41, R65b, P40d1, P24q, R66a, P40q at N. side of tomb against first pots. Hammerstones against E. side of tomb.
1559 Pots W41, P46g, R84, L30b from S. to N. against W. side of tomb, R87, R94p, L30c, L30b at W. side against first pots.
1560 Pots R81 (2) in N.W. corner of tomb.
1565 Pots P40e, B53a, R24a, P241, P24g, P93 along N. side of tomb, W24 in S.W. corner of tomb (disturbed ?).
1566 Basket in W. end (see Pl. IX, Fig. 3) containing (from N. to S.) pots P48, D36a1, R22a and P40e. The rest of the tomb disturbed.
1568 Pots R84e, R84h in S.E. corner of tomb, W24, R66a in N.W. corner of tomb, R84g, R26c at centre of N. side of tomb. Polishing stone on top of W24.
1570 Pots P40e1, W42 against W. side of tomb, R23b, R65b against first pots.
1571 Slate palette in S.W. corner of tomb.
1575 Matting over and under body. Wood fragments with cloth adhering.
1577 All pots at E. end of tomb.

1578 Pots R84d (2) and D20q in S.E. corner of tomb.
1580 Pots R84d, R67, R36, R26c, R66p, R66a, R76g, P40b, R66a, W24 in a circle in S.E. corner of tomb.
1582 Pots B18h, R941, R69h at N. side of tomb. Traces of matting above and below bones.
1583 Human remains were at the E. end of the loculus, animal remains at W. end of loculus. Pots disturbed.
1590 Pots L30h, L40a, L40b, D20p, L30h are against the N. end of the wall, R24m, L26f, P46a, W56g, L30g, L30h, L40b, L19p and L2a in L26f, against first pots.
1591 Pots L30g (3) in N.E. corner of grave, P241 at centre of W. side, L30g at centre of S. side.
1593 Three pots, all L30h in centre N. side of grave.
1595 Traces of a wicker *sarir* and a straw (?) canopy over body.
1598 Pots P24k, R81, P22c and B44b against W. side of tomb, D1u, R92, and P56 against first pots.
1599 Pots D31t, B41e, and R81 against W. side of tomb. Body partly in and partly out of loculus.

THE PROTODYNASTIC TOMBS.

Tombs 1207 and 1208 were obviously originally of considerable importance, though the frequent thorough robbing to which they have been submitted has removed much of their interest. Nevertheless sufficient remained to justify careful recording.

The Metrology.

On the plans of the two tombs the chambers have been marked in English letters and the walls in Greek. The following is a list of the dimensions of 1207 with the likely divisors and resulting units of length :

Tomb 1207	*Dimensions*	*Means*	*Divisor*	*Unit*
	cm.			cm.
Overall Interior length	511·5		8 (8 cubits)	63·9
,, ,, width	386		6 (6 cubits)	64·3
Chamber A	296		$4^4/_6$ (4 cs. 4 ps)	63·4
Chamber B	64			
,, F, East	64			
,, ,, South	65	64·4	1 (1 cubit each)	64·4
,, H, East	64			
,, ,, South	65			
Wall γ	68	.....		
,, ϵ	72	.....		
,, α	54			
,, β	56			
Chamber G, South	54	53·0	$^5/_6$ (5 ps. each)	63·6
Wall η	53			
,, ζ	48			
Chamber C	44			
Wall δ	41	43·3	$^4/_6$ (4 ps. each)	64·9
Chamber E, South	45			
Wall θ	34	.....		
Chamber J & Wall ι (J, 65, ι 54)	119		$1^5/_6$ (1 c. 5 ps.)	64·9
Chamber C, East	80			
,, E ,,	86	83	$1^2/_6$ (1 c. 2 ps.)	62·3
,, D ,,	111	.....		

Mean, weighted according to the squares of the lengths = 63·90±·13.
$\frac{1}{3}$ of palm ($\frac{1}{8}$ of 63·90) = 2·66
Mean of remainders, = 1·2

The unit of 63·90±·13 is reasonably close to the Persian or Sacred Hebrew cubit, the mean value of which for Egypt is given by Petrie (*Ind. Met.*, p. 49) as 63·75±·05. It should be noted, however, that Petrie derives his Egyptian value from some rather doubtful multiples of a whole cubit such as $\frac{1}{10}$, $\frac{1}{50}$, $\frac{4}{125}$, $1\frac{1}{16}$ and $\frac{3}{200}$, and his value for this cubit outside Egypt is higher, e.g. Persia 64·34±·05, Greece 64·45±·05, Assyria 64·2±·1 and Syria 64·0±·3. It will be noticed that there are four lengths which have not been used for inductions, the width of ϵ (72 centimetres, which may be intended for 1 cubit 1 palm), and the widths of γ, θ and D. If the width of γ is intended for 1 cubit then D would be 1 cubit and 4 palms. The length of A, 4 cubits 4 palms, is apparently unsatisfactory, but it must be remembered that it may have been split into chambers, the walls of which have disappeared. No explanation for the thickness θ is apparent. The groups of the two sets of dimensions giving means of 53.0 and 43.3 are rather unsymmetrical, but the grouping used seems most consonant with the other figures. If the dimension 48 cm. of ζ were omitted from both groups, the resultant unit would be slightly nearer to the Asiatic value.

Apart from these minor points the induction is a satisfactory one, even though the unit found is rather surprising. In addition to the check provided by the probable error, and by the likelihood of the dimensions, a further check was made by the method described in *The Bucheum* (I, p. 55), i.e. using the mean of the remainders. This was satisfactory, since the mean was somewhat less than half one quarter of the palm found by the inductions. Stranger than the use of this cubit at so early a date is the division of it into 6 palms, since duodecimal division did not otherwise appear until a later period.

A few other measurements in the tomb may possibly have been metric. The trenches in the base are 4 cubits 3 palms by 2 palms (but these are so rough that it is unlikely they are metric) ; the shelf round the top is 2 palms wide by 2 deep on the north and 2 palms wide by 3 deep on the south, the height of B is about 2 cubits 4 palms, of the south and east walls 1 cubit 4 palms and of the north wall 1 cubit 3 palms. None of these can be called probable dimensions excepting perhaps those of the shelf.

Tomb 1208, which is very close to 1207 in date, has a more elaborate though less accurate structure. Despite its inaccuracy, there can be little doubt that it is metric, as the following table shows.

It will be seen from the above table that the thicknesses of walls are given twice where these walls are long, whether the thickness varies or not, and this has the effect of giving additional weight to the walls which retain the same thickness throughout. Any other weighting was impracticable, the unit being a simple arithmetical mean. This is because, if dimensions were weighted according to the square of their lengths, very heavy weights would be given to some lengths, which, on account of the irregularities in the construction of the tomb, are the mean of two considerably varying dimensions. It is probable that the weights by the squares of the lengths, and the inverse squares of the probable errors, would cancel each other out.

It will be noticed that no inductions are made from the length of chambers A, D, E, and F. F is ignored because of its inaccuracy and damage which has been done to its construction. A is a remainder of 3 cubits 3 palms, when the length of B (2 cubits) and the thickness of i (4 palms), which is irregularly placed, is deducted from the overall length of the two chambers : D and E, together, may be intended to be 5 cubits, when the thickness of K (1 cubit) is deducted, but the irregular alignment of ϵ and η make them short of this. The induction is perfectly

straightforward, the dimensions being as satisfactory as can be wished. The unit 51·8±·2 is probably a short Royal cubit divided normally into 7 palms.

Tomb 1208	*Dimensions* cm	*Mean*	*Divisor*	*Unit* cm.
Overall exterior lengths	630, 642	636	12 (12 cubits)	53·0
Overall exterior widths	475, 465	470	9 (9 „)	52·2
Overall interior lengths	520, 500	510	10 (10 „)	51·0
Overall interior width	426		8 (8 „)	53·2
Length of H (Tomb Chamber)	302		6 (6 „)	50·3
Width of H „ „	202	207·5	4 (4 „)	51·9
Length of C	213			
„ „ G	108	106	2 (2 „)	53·0
„ „ B	104			
Width of E	54			
„ „ D	54			
Thickness of κ	54	52·8	1 (1 „ each)	52·8
Width of A	52			
„ „ B	50			
Thickness of ζ	46			
„ „ „	45			
„ „ η	42	43·5	6/7 (6 ps. each)	50·7
„ „ „	40			
„ „ θ	46			
„ „ ε	42			
Thickness of ι	32			
„ „ ι	32			
„ „ δ	30			
„ „ „	32	28·7	4/7 (4 ps. each)	50·3
„ „ α	26			
„ „ „	42			
„ „ β	25			

Arithmetical mean 51·8±·2

½ Royal cubit (51·8)	13·0
Mean of remainders of units of whole cubits	6·2
¼ Royal palm (7·4)	1·9
Mean of remainders of units of palms	·8

It is surprising to find two tombs so closely associated both in date and place, constructed with a different unit of length. It is not possible to assume that this result was due to the tombs being constructed with natural units, that is forearms of the builders, since the variation is too great. At first sight it may even be thought that such inductions are the results of coincidences and possess no value. If the inductions themselves were unsatisfactory, either as regards the probable error, or judged by the main dimensions of the tombs, it would be possible to dismiss them in this way, but they are not. Petrie says in *Inductive Metrology*, pp. 22–23 :

" After extracting some 600 units from measures of various qualities, I am inclined to consider that not 1 in 10 of these units is the result of fortuitous coincidence, and perhaps 1 in 20 or 30 might be a fair conclusion : estimating this by the frequency (or rather rarity) with which cases turn up, where each of two or more distinct and unrelated units would seem to satisfy all the measures ; since the proportion of fallacies being certainly small, the frequency of two ratios fitting the same measures will about show the proportion of fallacious results in the whole quantity.

" Judging thus, 1 in 10 is probably an over-estimate, but to make certain we will assume 1 in 5 to be fallacious. If so, it is 1 in 25 that any given pair of units are both fallacious, and 1 in 125, 600, or 3,000 that a group of 3, 4 or 5 units related to each other should be fallacious. It is

therefore evident what great improbabilities there are, of a mean unit, the result of a coinciding group, being a mere casual coincidence. Not only so, but this also shows how little likely the casual coincidences are to affect the mean of units to which they may be supposed to belong, and besides the improbability of their falling together in one group, it must be remembered that they will in most cases have larger errors than the genuine original units ; and thus as the weight that each has in determining the mean depends on its error, the fortuitous results (even apart from their scarcity) will but little affect the mean units. Also the false units would seldom fall casually into a group of real units, so as to be included among them.

" Thus though there is a certainty of a portion of these units being fictitious, and having no relation to the original unit employed (if there were any such cases), yet by the system of combining the similar units together into means, extending over some hundreds of years and of miles, we may rest assured that errors are checked to such an extent that the number of results to be recalled by future researches, will well bear comparison with the mistakes made in any other science.

" To reject all the results of this method of inductive examination, because some are false, is like refusing to use any money because there are some forgeries ; or like a gold-digger throwing away all he finds, because it may be pyrites, instead of reserving it for future tests."

The Royal cubit was found by Petrie in the tombs of the First Dynasties at Abydos, a little later than the present tombs, and the Persian cubit was also found by him in Egypt in the Fourth Dynasty (*op. cit.*, p. 49), but he evidently regarded the inductions for the latter unit from the Fourth and Twelfth Dynasties as somewhat doubtful, for in his article on " Weights and Measures " in *Ency. Brit.*, IXth Ed., 1889, he states that the earliest clear use of this cubit was from a tomb at Abydos of about 1400 B.C., giving a length of 63·83±·08.

Three wood coffins from Predynastic graves at Qau (*Bad. Civ.*, Pl. XXXI) yield a unit of 52·5 cm., but this is not a very satisfactory induction upon which to rely. Some work has been begun by the authors on the published dimensions of early tombs, but this is as yet insufficiently advanced to be used for purposes of comparison.

There is a possibility that 1312, also of Protodynastic date, is constructed with a unit of about 60 cm.

Brickwork.

The brickwork is discussed with that of the Dynastic tombs on p. 24.

Body Attitudes.

These are described with those from the other tombs, on p. 10, and the incidence of cosmetics is included in the discussion of the Predynastic burials.

Individual Tombs.—Tomb 1207 (Pl. IX, Fig. 5). The brickwork structures began only half-way up the tomb and beneath them there was a fine filling different from the coarse and lumpy rubble found behind the walls. There can be little doubt that this filling served some purpose and was not inserted merely because the tomb had been made too deep in the first place, although it is difficult to see why wall β should have been started at ground level. It appears that the body was buried in the soft fillings and the room above used for offerings. Is this the beginning of a superstructure ?

Chamber E contained the following pots, apparently undisturbed : 67b, 630, 67b, and four

of 66t (Pl. X, Fig. 1). The construction of the tomb is shown on the plan on Pl. V. An unexplained feature is the two trenches in the base of the tomb, which may have been made by the robbers who discovered that the soft filling beneath the walls contained a burial, but have rather, by their symmetry, the appearance of being original. Close to the southern trench, on ground level were found the four copper axes together with some remains of wood.

The tombs were almost certainly cut with copper tools since on a stone projecting from the wall surface was found a trace of green, obviously decayed copper. Moreover the tool marks looked like those of metal, and it was, in fact, their appearance which led us to look for the copper stains which were eventually found. The width of the tool blades was 8 cm. and the depth of the average cut into hard clay was 4 cm.

The evidence for a roofing over the upper chambers is not very great. On the south side there were traces of wood below the top section of wall, 25 x 5 x 3 cm. There were also traces of wood on the top of the east wall. On the other hand both the top of the wall and the shelf on the north side had an unbroken surface of plaster for a distance of a metre (Pl. X, Fig. 6), and it is difficult therefore to discover where beams, large enough to support such a span, could have been placed. Possibly the side chambers only were roofed, the centre being filled in.

The enormous number of fragments of stone vessels was one of the most striking features of the tomb.

1208 was somewhat similar in construction (see plan on p. V) and also had a large number of fragments of stone vases. The blue glaze faience beads from both these tombs are unexpected.

1312 was an undisturbed, well-preserved tomb (Pl. X, Fig. 2). Its most interesting product were the stone beads glazed in the Mesopotamian manner. The positions of the objects are shown in Pl. LI.

1317, 1350, and 1353 call for no comment.

Archaic, Old Kingdom, and First Intermediate Burials.

Only one of the Archaic tombs, 1201, was securely dated. An alabaster table in the tomb showed that it belonged to the Second or Third Dynasties. The remainder were tightly contracted burials in wood coffins, frequently buried with a layer of stones above the burial, or, as in 1332 (Pl. X, Fig. 3), with a wall of these rough stones round the tomb. The date of this type of burial is sufficiently well established to justify placing them between the Second and Fourth Dynasties. The coffin of 1319 (Pl. X, Fig. 4) is described on p. 137.

Four pot burials had pots which typed to the Fourth Dynasty and one other (1320) has been similarly dated by analogy. Two pot burials from the same area, 1317 and 1353, have been dated to the Protodynastic period, one by the pot type and the other by the beads. The Second to Fourth Dynasties is the period in which these curious burials are most frequent.

Akin to the Archaic tombs described above are 1330 and 1352, two burials in mud brick vaults, dated by the pots in 1330 to the Old Kingdom. The vaults are drawn on Pl. XII. It seems probable that these burials are in direct descent from the Archaic graves with the stone coverings.

To the east of the house is a large cemetery of deep shaft tombs, certainly mostly of the Old Kingdom. Unfortunately the mouths of the shafts are in hard clay rock and they have all been well cleared by robbers. We tested two without much result ; 1204, which had a modern burial in the shaft (1204A), and from which we hoped evidence might come as it had not been

touched in modern times ; and 1206, with a shaft about 15 metres deep and 2 metres square. The results were disappointing, and the only interesting feature was the painted gesso found in both. Fragments of stone vessels and potsherds of typical Old Kingdom date served to date the burials.

The three most interesting burials of the Old Kingdom were 1309, 1310 and 1323, all shaft tombs with chambers leading off them.

There is some doubt about the date of Burial A in 1309. The body was in a wood coffin which had been covered with painted gesso, and a small part of this remained and was copied (see p. 137). It is Professor Gunn's opinion that the text is most likely to be Middle Kingdom or later. Against this, as has been pointed out above, Old Kingdom tombs at Armant produce painted gesso, and it may possibly be that Middle Kingdom coffin texts originated in this neighbourhood—but this is only a very tentative suggestion. Burial C, beside A at a lower level, produced broken pots of the Old Kingdom. The most probable explanation is that A was a later burial inserted on the top of the others, and this is partly supported by the position of the body 8F10, whereas that of B is 6D9. The beads from the sieving of the tomb might belong to any date from the Old Kingdom to the Middle Kingdom. The coffin of A was against the west wall of the chamber, filling its width. The walling was unbroken and burial A was therefore intact.

Though the dating problem in 1309 is difficult, it does not affect any issue outside itself. In 1310, on the other hand, it is of some importance. In this tomb there were certainly burials of two dates, though those of the earlier were not preserved, at least in the west chamber (W). Here there were the remains of a wooden coffin, containing the robbed burial of a female. The coffin had been supported on a " queen bat," on account of the irregularity of the floor, which for a depth of 5 cm. consisted of owl pellets. Beneath this was a further 27 cm. of filling, containing nothing of interest. The curious layer of rodent's bones extended over almost the whole of the floor, and must therefore have made almost 115 litres of debris. I have not seen more than one owl fly out of an open tomb shaft, but, allowing for the nesting period, it might be assumed that there are two owls living there at a time. Here then is a pretty sum for a mathematically-minded zoologist, though the results would contain a large possibility of error. I should be surprised if it were possible to show that the accumulation must have taken more than fifty years. The pottery outside the chamber entrance in the shaft was all of the Fourth Dynasty, there being no other pottery in the tomb. The position of the body, 8?9, is more frequent in the Middle Kingdom than earlier, but occurs not infrequently in the Fourth Dynasty (*Qau & Badari I*, 51). The bricks are smaller than those of 1309 and more probably Old Kingdom than Middle. These details are important, since beads were found at the neck, left-hand and right-hand, strings A, B, and C respectively (D was from the general sieving). All the beads were of interest, but of especial importance were some of glass (see p. 72). Mr. Brunton considered the beads to be Old Kingdom in date, and Mr. Beck inclined to the same opinion. They have, therefore, been dated as such, since the bulk of the archæological evidence also favoured this view, but a slight doubt must remain. Some grains of wheat were found in the tomb.

In the North chamber (N) the walling was intact (the bricks, curiously enough, being large) and the burial was securely dated to the Fourth Dynasty by pottery found with it. The fact that this chamber was not robbed is strong presumptive evidence that the second burial in the North chamber was also of the Fourth Dynasty, because, if the tomb were opened between the Old Kingdom and Middle Kingdom and re-used in the latter period, the workmen would not have

known that the burial in the North chamber contained no valuables and would have opened it. The fact that the rich upper burial in the West chamber was robbed, and the poor burial in the North chamber untouched, shows that the robbers were aware of the different contents and that the pillage must have taken place soon after both burials, i.e. not later than the Fourth Dynasty. The head of the skeleton was resting on a stone. The right arm and right leg were disjointed, but this can safely be attributed to a fall of the roof or to natural disintegration, since the only disturbance was the falling away of the limbs at the joints.

1323 of the Fourth–Fifth Dynasties was robbed and produced no features of especial interest. There were boulders against the outer face of the walling of the West chamber.

The three First Intermediate tombs need no comment.

The Middle Kingdom Tombs.

1213 and 1214 were two large tombs situated in the neighbourhood of Deir el Abyad. The excavation of 1213 was completed, but 1214 could not be finished in the time available to us. As in the Bucheum, it was necessary to cut down to the chambers through the roofs, and this entailed much labour and time. The tombs were also damp, like those of the cows and bulls, and this made work more difficult, as well as damaging the antiquities.

The formation of the ground in the neighbourhood of the tombs has been discussed at the beginning of this chapter, when dealing with (E.P.III) Badarian remains in the wadi bottom.

The construction of the tombs was found to be too rough for any metrological inductions to be made from so few chambers.

There is little doubt that these tombs were family vaults kept open for a considerable period, and the difficulties in dating them are probably to be attributed to this reason. It is not impossible that one of these tombs may have extended from the Eleventh to the Thirteenth Dynasty, and, as such a hypothesis fits best the dating difficulties, it has been adopted.

Extensive robbing made the positions of objects in the tombs of little significance, with the exception of a few objects found actually with the bodies themselves. This applies especially to the group found with 1213A. Even the stela was too obviously disturbed for its position to be of any evidential value (see the photograph of it *in situ* on Pl. XI, Fig. 5). The pottery was all so scattered about that no purpose could be served in describing the positions of the various specimens. Stelæ niches can be seen in the wall of 1214 (Pl. XI, Fig. 1) but none was found in this tomb. The same photograph shows the entrances cut through the rock. Fig. 2 shows some pottery cones lying inside one of the entrances, and possibly *in situ*. Fig. 3 shows the mud brick wall to the left of the entrance in 1214, and Fig. 4 burials 1213A and B.

Individual Burials.

1213A, despite the apparently complete state of the finds with this body, had been disturbed after burial, several of the bones were displaced and the left hand and part of the right hand were missing. Possibly the body was robbed solely of gold objects soon after burial. It is also possible, since the tombs are close to the cultivation, that rats were responsible for the disturbance. The body had been in a wood coffin, 45 cm. wide, covered with coloured plaster or gesso. It was not possible to discover more than the width of the coffin, owing to its extreme state of decay. The gesso from the lid was spread over the bones. The presence of fabric was established by its semi-preservation in products of corrosion of the mirror. The fabric was made from reed fibre.

The eight strings of beads are fully described on pp. 112 ff. Despite the disturbance, the positions of the different strings on the body could be ascertained with some certainty, and even the order of the beads on the strings is tolerably fixed, more especially as they conform with the known practices of the period. (1) was found at the right shoulder, coming from the neck ; (2) at the right elbow ; (3) undoubtedly a double string, appeared to come from the right wrist ; (4) from the left wrist ; (5) and (6) were both found just below the pelvis, lying across the body, and must have come from the hips, probably worn like the girdles shown in scenes of banquets of the Eighteenth Dynasty (*vide* B.M. 37, 984 and 37, 986) ; (7) came from the right ankle, and (8) from the left ankle. Though it is not uncommon to find beads round the waist or hips in the Middle Kingdom, the women do not appear to have been generally portrayed so dressed at that time.

The mirror was found on the chest, the tang for hafting pointing towards the feet. None of the handle remained. The mirror proved to be of copper, which is perhaps not unexpected, as the Middle Kingdom is only the beginning of the bronze age, though bronze with a high tin content makes a much better reflecting surface.

The alabaster pot was found above the legs, but it is doubtful if it were *in situ*, and possibly it did not belong to the burial.

1213C. Blue frit beads were found near the right wrist, like those from A. The remainder of the body was badly disturbed, being destroyed from just above the pelvis. This may indicate that the complement of the beads was similar to that of A.

1213D was extremely disturbed. One bead was found under the head (not in position) and the rest came from the seiving. One was of blue glass.

1213G. The body was partially disturbed. The beads were found under a separate skull lying inside the remains of the coffin by the right hand.

1213H was represented by a skull only, beside which were found some beads. This proximity of beads to skulls separated from their bodies suggests that robbing took place not very long after burial, while the strings of the beads were still intact.

1213I was the burial of a child, with shell pendants near the head.

1214. The statuette was found inside pot 8H, just inside the first column from the east. No distinct burials were found in the parts of the tomb excavated, but a number of human and animal bones were scattered about, together with a quantity of pottery.

1200A was a group of beads found near the entrance to 1213 ; amongst them were some of red glass, described on p. 72.

Late Burials.

1204A was the clandestine burial of a man killed about twenty-five years ago, probably in a brawl between tomb robbers, as the place used was a shaft in the midst of what must have been a rich Old Kingdom cemetery.

1301A was the burial of a child in the shaft of an earlier tomb. The wood box found with it and described on p. 137 was supported by two large lumps of rock.

1302, 1305, 1306 were all late burials intruded into earlier tombs. Each one had the remains of a dog in the tomb, disturbed in 1302 and 1306, and undisturbed in 1305. A photo of the dried body of the dog from 1305 is given on Pl. XLV, Fig. 8. It was lying across the entrance to the tomb, just inside, with its back to the mud brick wall, as if placed there as guardian. The

wall had been broken through and the rest of the burial had been completely disturbed. Underneath the dog was a bed of vegetable material, and Mr. Boodle reports that some of this is undoubtedly maize straw. Maize is generally said not to have been introduced to Egypt until recent times.[1] The burials therefore offer considerable difficulties. Is it a coincidence that an Arab dog in modern times wandered into a tomb to die nearby two others where dogs had been previously buried? Or are the other remains those of modern dogs, torn to pieces by jackals? If so, why such a holocaust of dogs in one spot and none elsewhere? Or was Santa Rosa de Viterbo[1] right after all? It may be suggested that the dog was moved on to the maize straw by modern robbers, but it would not have held together, if moved in modern times, and the position was altogether too natural for this explanation to be the correct one.

Tombs of Uncertain Date.

Under this heading have been included all those tombs which contained no objects or other evidence by which they could be dated, or contained objects apparently contrary in date to the other features of the burial. Photographs of 1334 and 1333 appear on Pl. X, Figs. 5 and 6 respectively.

The Brickwork of the Tombs.

The most interesting brickwork was that of tomb 1207 in the Protodynastic period.

Three kinds of brick were used in this tomb, a good black brick (A) similar to the normal mud brick of Egypt; a bad black brick (B) probably made without any admixture of sand and certainly without chaff, and a medium quality yellow brick (C) made obviously from the local clay of the low desert, with no Nile mud added to it. It is perhaps not too fanciful to suggest that a quarrel took place between the builders of the tomb and the brick maker, and that the former decided to make their own bricks rather than be swindled. The sizes of the bricks were: (A) 23 × 11 × 8, (B) 26 × 13 × 6 and (C) 26 × 11·5 × 6. These figures are the means of several measurements; in each case the vertical interstices ranged between 0·1 and 1 cm. and the horizontal were 2 cms. The bonding was most irregular and no bond could be typed or drawn, except that one wall was apparently B 1 a.

The bond was obtained in some of the dynastic tombs, but, in so small a space as a chamber blocking, the bond can hardly be regular. The drawings in the bond corpus (Pl. XII) have therefore been regularised and formalised to a certain extent, to make them useful for the recording of more carefully built walls, but any difference is noted in the list below. Only one bond type is referred to without any drawing, W 1·5 a and this will be found in *The Bucheum*, Pl. CXII, but it is the same as W 1·5 a10, drawn on Pl. XII, except that there is no plaster filling in the centre of the wall. Where possible, the bond is shown with the correct size bricks, but the list

[1] Maize. *Ency. Brit.* XIth. Ed. Vol. XVII, p. 448.

Article on maize. "It is unknown in the native state, but is most probably indigenous to tropical America. Bonafour, however (*Histoire Naturelle du mais*) quotes authorities (Bock, 1532, Ruel and Fuchs) as believing that it came from Asia, and maize was said by Santa Rosa de Viterbo to have been brought by the Arabs into Spain in the 13th century. A drawing of maize is also given by Bonafour from a Chinese work on natural history, *Li-chi-tchin*, dated 1562, a little over sixty years after the discovery of the New World. It is not figured in Egyptian monuments, nor was any mention made of it by Eastern travellers in Africa or Asia prior to the 16th century. Humboldt, Alphonse de Candolle and others, however, [*sic*], do not hesitate to say that it originated solely in America . . . and that is the generally accepted modern view."

shows that these blockings were frequently constructed with a miscellaneous assortment of bricks of odd sizes and shapes; as the result of this, the interstices were necessarily very irregular and were, for this reason, not recorded. 1309 (W 2 b2) is the only blocking with a homogeneous group of bricks.

The only interesting new bond is A 0·5 b, an Old Kingdom *qubwa*, or burial vault. The bonding of the lower two courses of the supporting walls is uncertain, and is for that reason shown on the dotted line. The actual vaults are far less regular than the drawing, which is formalised.

It seems inadvisable to attempt to find the unit of manufacture of any of these bricks, considering the difficulty that was experienced with the superior Græco-Roman bricks of the Bucheum (see *The Bucheum*, Vol. I, pp. 48–49).

Comparing the Armant brick sizes with the much bigger list to be found in *Qau and Badari II* (Tomb Registers, Pls. L to LXIX) the only notable difference is that at Qau the large brick 35 cm. in length does not appear until the Ninth–Tenth Dynasties and then with only one example. There are no larger bricks. There is one tomb of the Seventh–Eighth Dynasties with bricks 34 cm. in length. There appears to be greater uniformity in the brick sizes of each period at Qau than at Armant; possibly this is because the cemeteries were sufficiently large to justify the manufacture of bricks for the graves, whilst those of cemetery 1300 (of small extent) were odd bricks collected where they could be found. With one exception, the Fourth Dynasty sizes, from ten tombs at that site, range only from 29 to 32, from 14 to 16·5 and from 6·5 to 7·5 cm.

O. H. M.

TABLE OF BRICKWORK.

Tomb	*Date*	*Position of brickwork*	*Bond*	*Interstices* cm.	*Brick sizes*	*Comp.* (Normal=mud & chaff)
1201	Uncertain	Tomb blocking	—	—	27 11 7	Mud only
1207	Proto	Walls, see Pl. V (plan)	Irregular	Hl[1].2 Vl[1].0.1–1	23 11 8	Normal
					26 13 6	Mud only
					26 11½ 6	*Gebel* and chaff
1303	Late	Tomb blocking	W.1.?	—	28 12 7	Normal
1305	,,	,, ,, (Plastered outside)	W 1 b2	—	31 15 9	,,
					25 12 8	,,
1308	V.	Brick frags, only	—	—	—	,,
1309	IV? XI?	Tomb blocking	W 2 b2 (joints unbroken)	C.O.3	35 15 8	,,
					37 20 11	,,
					34 20 9	,,
					35 19 10	,,
					37 19 9	,,
					36 19 11	,,
1310W	IV–V	,, ,,	W 1 c1	—	29½ 14½ 10	,,
					25 11½ 9	,,
N			Irregular	—	34½ 17 8½	,,
1323W	IV–V	,, ,, (Boulders in front)	W 1.5 a10	—	35 15 9	Sand and mud, no chaff
					28 14 7	(Mortar do.)
,, E	,,	Tomb blocking	W 1.5 a (One course on edge)	—	32 19 9	As above
					31½ 17 11½	,, ,,
					27 14 9	,, ,,
1330	V–VI	Encircling top of tomb	W 1 b2		25 12 7	Normal
		Burial vault	A 0.5 b	—	35 17 6	,,
					30 15 10	,,
					29 13 8	,,
					28 16 7	,,
					26 13 8	,,
					26 12 10	,,
1352	II–IV	,, ,,	,,	—	25 13 8	,,
1354		Remains of vault?	A 0·5 b (?)	—	34 12 6	,,

[1] Hl. Horizontal. Vl. Vertical.

TOMB REGISTER: PREDYNASTIC

Tomb No.	Graves N. E. D.	Loculus N. E. H.	Azimuth	Body Attitudes Pl. XII	Sex	Pottery: Pre. Corpus, Bad. Civ. & Pls. XXXII–XXVIII — B.	P.	F.	C.	W.	D.	R.	L.	Beads Pls. XXXVI–XLI	Slate Pls. XV & XIX	Stone Objects Pls. XVII–XXI	Miscellaneous and Remarks	S.D.	Disturbed	Tomb No.
1202							1a3	11d	47a						91R1			33–37	Q.	1202
1205	Hole														94A	Alabaster vessels 4, 5, 6			Q.	1205
1209A	Hole 40			2B2′″	F.												Fœtus bones in pelvis:	EPIII		1209A
1209B						BB19k											matting: sherds ?: Bone point	(Bad)?	P.	1209B
1211														√			In 1400 Cemetery			1211
1212														√			In 1400 Cemetery			1212
1327	Hole		284				85g 98a											50–59	Q.	1327
1328	100 70		274			53b						81						38–67	Q.	1328
1338												22a 84d 94p					Pot group	35–80		1338
1339	Hole 75		245	4G9″″	C.		24n					62a					C. 6 to 7 years		N.	1339
1341					C.							67						39–74	Q.	1341
1342 (A)			260	3??′″	F							84c 84d (2)						60–64	P.	1342(A)
1342 (B)											61m								Q.	1342(B)
1343							24k					3c 69r(2)81h(2)					Pottery group	42–63		1343
1344	130 100 100		285	2??″″							45s	24m	30k 36n	√				77	Q.	1344
1345	80		265	3D?″″	M.							65c						60–73	P.	1345
1346	80									60g		84e (2)	16n		87F			77–78	Q.	1346
1347						35g 53a	11d 40a					22a (2) 33a 34b 65d 67 81(2)	16bb					64–65	Q.	1347
1348	Hole 110		260	2??″″	M.								36w	√		Flint			P.	1348
1355	80		240			39b	84g					34c	6b					60–63	Q.	1355
1356	70						33					91b (2)					Pottery group	35–36		1356
1357							40c 93d					3a 33b 34a 69b 81 84d 87		√		Breccia Vase 2	Pottery group	44–64		1357
1358																			Q.	1358
1359													16g			Square flint adze		53–65	Q.	1359
1360												81						38–67		1360
1361							24n					81c(2) 94					Pottery group	49–53		1361
1362						63b				43b1		3b 26e 75 81					Pottery group	39–41		1362
1363											32 1	81(5) 84d					Pottery group	38–67		1363
1370	Diam. 150		250	4D1″″	C.	42a	42					34c(2) 57c 65c(3) 84(3) 85s		√			Lambs bones: C. of 7 years	46	N.	1370
1401	Diam. 70 40		200	3??″″											90D			31–58	P.	1401
1402	115 90 40		235			16 75b 76a 77a	11c								28B	Pebble		35–40	Q.	1402
1403	97 75 35		270	4??″″	C.	77a											2 Mutela Dubia. Amber (remains of bead ?)	34–41	P.	1403
1405	Hole 30		215	3??′											91B			37	P.	1405
1406	120 90 60		265	3??″″		74a 74b											Traces of wood in pots	33–57	P.	1406
1407	Diam. 80 78		270		F.							69c					Matting	36–68	Q.	1407
1408	120 90 100		255								10g1	1a 82b	53q				Cut through a tree root	50–63	Q.	1408
1411	100 60		245	2C2″″	C.	55b 58c						3c		√	91P		Malachite	42–44	N.	1411
1412	80 30		225	3B1″″		55b	22a					3a 61a						56	P	1412
1413	Hole		240	3A1″″	M.	35a								√		4 Flint Knives		32–43	N.	1413
1414	90 80 70		225	3F2′″	M.	19f													N.	1414
1415						35e 57a	4										Pottery group	36–38		1415
1416	Hole					35e 57a2											Traces of Matting	36–51	Q.	1416
1417(A)	160		250	3??″″	M.	19a						69c					Piece of ostrich shell	36–47	P.	1417(A)
,, (B)				?	C.															,, (B)

TOMB REGISTER: PREDYNASTIC—*continued.*

Tomb No.	Graves N. E. D.	Loculus N. E. H.	Azimuth	Body Attitudes Pl. XII	Sex	Pottery *Pre. Corpus, Bad. Civ. & Pls. XXXII–XXVIII* B.	P.	F.	C.	W.	D.	R.	L.	Beads Pls. XXXVI–XLI	Slate Pls. XV & XIX	Stone objects Pls. XVII–XXI	Miscellaneous and Remarks	S.D.	Disturbed	Tomb No.
1418						58b	47a					81(2) 91a(2) 92					Pottery Group: Sherds	43–44		1418
1419					C.	80e						26c 69b 81(3) 92		√				44–61	Q.	1419
1420	.82 75		260	3??″″		216						81					Matting over body	38–47	P.	1420
1421	56 90 50		145		M.	57a2 57b						17e 21b 83g			81D	Pebble		36–44	Q.	1421
1423	137 95		294	3D2″″	M.	62a						92				Flint Blade		44–57	N.	1423
1424	110 65		219	4J2″	M.									√	B. Corpus 5	Pebble	Malachite		N.	1424
1425	Diam. 70				F.	7461	22b					3b	N68a				Matting	41	Q.	1425
1426	70 110		350	3??″	F.		23a										Matting	38–73	P.	1426
1427	80 90		205				7 15b 96b							√	91Q		Malachite	34–42	Q.	1427
1428	70 40		241	5L1″″	C.								12b					47–81	N.	1428
1429	80 130 80		210	3??″	M.	25 1													P.	1429
1430					C.	58a 76m					62a	17c 81 92	16f					46–61	Q.	1430
1431(A)	60		300		?	27c						81s			44A			62–63	Q.	1431(A)
„ (B)					C.															„ (B)
1432	100 85 80		245	4J2″″	M.	29b	4 18c 63m											35–38	N.	1432
1433	80 110 100		210	3??″		74b											Matting	33–76	P.	1433
1435(A)	120 100		265	2C1″″	M.	57b											Matting over bodies:		N.	1435(A)
1435(B)					C.												Very young child: Sherds	31–75		1435(B)
1437						58a 74a											Pottery group	35–61		1437
1438			260			74b											Ivory Vase *Pre.Eg.* XLIII 16	33–76	Q.	1438
1439	Diam. 90					58a						66a						42–68	Q.	1439
1440	120 88 100		301			42a(2)	24m 80s 84i					69j 81 81j						57–64	Q.	1440
1441	95 60		309			42a	24m 84i					81 93c						57–64	Q.	1441
1442	120 70		310			68b	24m 84a					69c 81						57–61	Q.	1442
1443														√			Malachite		Q.	1443
1444	60 50		284	2B2″″	C.												Traces of Matting		N.	1444
1445	100 80		286		M.	61a												34–54	Q.	1445
1446	180 180 80		254				40e					66a 69g 81					Traces of matting: Bag of malachite in matting	42–67	Q.	1446
1447	100 70		290	3D2″″	M.	68b												31–61	P.	1447
1448	100 80		240		F.	62a						3a 11 23b 81c 92		√				45–57	Q.	1448
1449	200 100 100		280	3D2″″	M.	61a 74a						92(2) 93c					Matting Spec. 20/32/5. See Report	58–61	P.	1449
1451	120 70 100		275													2 Hippopotami	Traces of Matting Spec. 20/32/3. See Report: Bones of Jerboa		Q.	1451
1452	80 60 50		250	3b1″″	C.	74a											Traces of matting	31–61	N.	1452
1453	135 75 110		284		F.	71b											Traces of matting	37–43	Q.	1453
1454	90 50 100		275	2b2″″	M.												Traces of matting		N.	1454
1455	90 60 100		300	3B2″″	C.	35a											C. of 6 years	32–43	N.	1455
1457	110 50 70		250					14	44b					√		Fishtail flint: Triangular piece sandstone	Bone Comb: Traces of matting Spec. 20/32/2: Robber's Turiah Blade Cotton? pebble	35–53	Q.	1457
1458	100 160		220			57a 74a 74b1 94c	24k1				63a1	17d 67		√				39–61	Q.	1458
1459	80 50		215	2C2″	F.	74c									91P1		Matting over body	33–73	N.	1459
1460	110 80 90		290	2D2″″	F.	74a											Matting	31–61	P.	1460

TOMB REGISTER: PREDYNASTIC—*continued.*

Tomb No.	Graves N. E. D.	Loculus N. E. H.	Azimuth	Body Attitudes Pl. XII	Sex	Pottery: *Pre, Corpus, Bad. Civ. & Pls. XXXII–XXVIII* B.	P.	F.	C.	W.	D.	R.	L.	Beads Pls. XXXVI–XLI	Slate Pls. XV & XIX	Stone Objects Pls. XVII–XXI	Miscellaneous and Remarks	S.D.	Disturbed	Tomb No.
1461	190 110 100		270		C.?	57b3 57g 58b								√			Matting: 1 Spatha Rubens: Fragments: 2 Ivory wands	43–50	Q.	1461
1462	80 60 70		280	4G2″″	C.									√			Matting		N.	1462
1464	190 120 140		230			53c				19		22a(2) 65b					Traces of matting: Fragments of malachite	55–65	Q.	1464
1466	190 110 140		215	3??″″	M.	14g 25d3(2) 25f2 25g 27a 53a	24n					84			140	Pebble: Gypsum jar 1. Flint flake	Galena: Malachite: Rouge: Resin: Linen Sheets: Bed of wood & matting: 3 gesso objects: Gazelle skull	38–48	P.	1466
1467	120 90 100		300	4J?″″	M.	62b2													P.	1467
1468	230 135 240		260			37b 44x	95b			43b(3)		84t					Pottery group	57–66		1468
1469	110 60 100		260		C.						23c	91c 93c 84t	53q1	√				58–62	Q.	1469
1470	115 100 150		295	5??″″	M.	11m 57b1											Matting	38	P.	1470
1471	80 70 105		305	3B1″″	M.	57b1											Matting over & under body: Basket with corn & ?	38?	N.	1471
1472	150 90 130		285	3A4″″		55b 57b 69a	23a										Sticks: Matting: Linen over body	38–61	P.	1472
1473	120 88 100		260	5B1″″	M.	11f 72a						81v					Matting over and under body: Bed? Tree root cut through by grave	46	N.	1473
1474	110 100 120		275		M.	76g	38k										Matting	52–63	Q.	1474
1475	100 65 110		270	2A2″″	F.												Body semi-prone: matting over and under body: skin over body		N.	1475
1476	75 150 120		355			94n	24c							√					Q.	1476
1477	120 85 155		290	3?2″″	M?												Matting over and under body. "Eunuch"		P.	1477
1478														√					Q.	1478
1480	Diam. 50 80					72c	11b										Pottery group	35–47		1480
1481	120 80														91B	Polishing Stone: Flint: Stone: grinder	Sherds: Traces of Wood Coffin: Malachite	37	Q.	1481
1482	Diam. 80				M.									√			Incised Bone		Q.	1482
1483	85 70		230	2B1′″	M.												Gazelle skin garment over body and wrapped round feet: Linen: Traces of Matting		N.	1483
1484	Diam. 90 75														Frag. possibly 5 (Bad. Civ. LII)				Q.	1484
1485	140 60		260									44c 85g 92		√			Fragment Black Pot	60	Q.	1485
1486	100 50 100		285	4J2″″	C.	57b1	24n										Matting under body	38	N.	1486
1487	110 70 100		290		M.	55b	24n										Traces of matting	35–36	Q.	1487
1488	75 55		270		C.	72a						65b					Traces of matting	47–63	Q.	1488
1489	180 140		273			35b											Ivory? point (Part of game)	38–46	Q.	1489
1490					M.												Record Lost: Bones reported on			1490
1492	75 100 70		220		F.	42k	23c					57a 81	12d				Feathers	39–67	Q.	1492

TOMB REGISTER: PREDYNASTIC.—*continued.*

Tomb No. | Graves | Loculus | Azimuth | Body Attitudes Pl. XII | Sex | Pottery *Pre, Corpus, Bad. Civ. & Pls. XXXII–XXVIII* | Beads Pls. XXXVI–XLI | Slate Pls. XV & XIX | Stone Objects Pls. XVII–XXI | Miscellaneous and Remarks | S.D. | Disturbed | Tomb No.

TOMB REGISTER : PREDYNASTIC.—*continued.*

Tomb No.	Graves N. E. D.	Loculus N. E. H.	Azimuth	Body Attitudes Pl. XII	Sex	Pottery *Pre. Corpus, Bad. Civ. & Pls. XXXII–XXVIII* B.	P.	F.	C.	W.	D.	R.	L.	Beads Pls. XXXVI–XLI	Slate Pls. XV & XIX	Stone Objects Pls. XVII–XXI	Miscellaneous and Remarks	S.D.	Disturbed	Tomb No.
1493	130 180 100		45		M.		75a					23b 24b 81 81h 81		√			Wood fragments : Matting under body. Skull (modern ?)	38–71	Q.	1493
1494	160 200 140		38									26e 41c 69b(3)					Wood traces : Iron ring	38–67	Q.	1494
1495	100 140 150		195			74a					67d	69c 69g 81(2)					Matting under body	38–61	Q.	1495
1496	110 170 140		45				11f				67r	91a(2) 94h 94k(2)						55–57	Q.	1496
1497	130 100 105		240	3??''	F.							81						38–67	P.	1497
1498	100 145 160		25				23c 24g 24p 40b1					81 84d 84e						38–67	Q.	1498
1499(A)	140 180 132		170		M.	53a	24n					81(3)				Flint Point		38–66	Q.	1499(A)
„ (B)					?															„ (B)
1501	200 100 100		290		F.	57a								√			Fragments of Ivory	31–62	Q.	1501
1502	100 80 80		276	3K2''	C.	57b 62a								√				37–57	N.	1502
1503	100 80 80		284											√					Q.	1503
1510	120 85 150		255	3??''		78c	24g					85s					Two Ivory Combs : Linen and matting on floor : Sticks and matting at sides : Sarir ?	43–46	P.	1510
1511	180 100 140		250	6??''	M.	53a	23b 45b1					81(2) 84e					Wooden framed bed with matting : Sheets 2 or 3 thicknesses	41–66	P.	1511
1512	170 88 120		264				40g1			47m(2)		65c 84c 84d						60–73	Q.	1512
1513	165 100 140		260				23d					24b(2)			46S		Cut through tree root	63–64	Q.	1513
1514	160 110 200		240			38c1 53d	23c 93b			43g		33b 65b					Cut through tree root	47–65	Q.	1514
1517	135 90 135		235				23b					81(2)					Bread as in 1566 : Basket : Matting longitudinally	41–67	Q.	1517
1518	165 80 120		240		M.		24r 45c1					23b	30g(9)36n(2)				Wood coffin : Gazelle Bones	75–77	Q.	1518
1519	160 70 140		280									65c 81f(2) 84e(2)	7b 16b					73–79	Q.	1519
1520	200 90 130		281			53f 57b1						66m					Remains of saris matting and sticks		Q.	1520
1521	175 100 100		73			53a						3f8 66b						63–66	Q.	1521
1522	160 90 135		72							43b		26c 84?				Polishing Pebble		57–66	Q.	1522
1523	225 110 145		77									81(5) 94h				Fishtailed flint		48–53	Q.	1523
1524	180 100 130		90									81				4 Flint Blades		38–67	Q.	1524
1525	100 200 150		224									22b 34a 81(4) 84d 84e	7b ?					44–67	Q.	1525
1526	140 85 75		62			57b	16											72–75	Q.	1526
1527	120 145 110		29				23a 23b					81				Flint		33–58	Q.	1527
1528	100 100 110		54				23b					81						41–67	Q.	1528
1529(A) 1529(B) 1529(C)	130 130 80		255	4'' 3?2''	C.												Gazelle skeleton : Hide under backbone : Matting round body Matting round body Fragment of Resin		P.	1529
1530	100 80 80		75				24m				10m	81(3) 84d(5)				Flint Knife		57–64	Q.	1530
1531	240 120 130		66								68a	81(2)			46S			39–61	Q.	1531

TOMB REGISTER: PREDYNASTIC.—*continued.*

Tomb No.	Graves N. E. D.	Loculus N. E. H.	Azimuth	Body Attitudes Pl. XII	Sex	Pottery *Pre. Corpus, Bad. Civ.* & *Pls. XXXII–XXVIII* B.	P.	F.	C.	W.	D.	R.	L	Beads Pls. XXXVI–XLI	Slate Pls. XV & XIX	Stone Objects Pls. XVII–XXI	Miscellaneous and Remarks	S.D.	Distributed	Tomb No.
1532	150 80 90		65	5??′″	M.	42b 57a 68b	24m					66p 81					Matting over body	57–61	P.	1532
1533	200 120 150		280																Q.	1533
1534	170 100 200	170 60	240		M.	29c(2)	38 45b2			19				✓				63–66	Q.	1534
1535	150 100 130		265	5??′″	M.		1b3 80s					81(2) 92			44H	Pebble	Traces of matting	44–61	P.	1535
1536	180 100 110		90				23c1 44a			19						2 Hammer stones 1 Basalt Grinder	Bones of a small mammal	52–66	Q.	1536
1537	170 100 130		95													Flint Flake	Bones of a small mammal		Q.	1537
1538	110 50 50		70	3D2′″	F.		24m				34	92		✓		Alabaster Rhomb		57–61	P.	1538
1539	150 90 120		250			50	40c 75g1 95b					23b 27(2) 44u 66p 67 81			Frag.	Flint		52–65	Q.	1539
1540	140 100 120	110 40	245								68a							39–61	Q.	1540
1541	210 200 130		250			35d 38a 39b 39b1				19 27	63d	21d 26c 65b 69b(3) 84e(2) 84h(3) 94	16g			Polishing stone		58–62	Q.	1541
1542	235 150 160		260							24(2) 43b		3c 22a(6) 84h (4)					Little Resin: 3 Pottery "hands"	57–63	Q.	1542
1543	120 80 100		245		M.							42a						53	Q.	1543
1544	150 100 100		245			19c(2) 21d						3a 34a 91c					Pottery group	44–46		1544
1545	130 80 100	30 20	255	3D2″″	F.							84 84c(2)						52–76	N.	1545
1546	115 95 105		245	4J2″″	F.							34c					Child's bones	43–73	P.	1546
1547	170 100 170		265								63a			✓		?Burnishing stones	2 Copper Bangles: Limonite	48–63	Q.	1547
1548	150 140 110		250		F.		24k				1m	23c 81 84g(2) 94k				Polishing stone	Traces of matting	38–67	Q.	1548
1549	Diam.120150											81(2)						38–67	Q.	1549
1550	200 100 100		70				24m 24n 40c			19(2)	31?	23b 66p(2) 81				Vessel 3: Small polishing stones		57–64	Q.	1550
1551	150 100 110		270									81(2)						38–67	Q.	1551
1553	150 120 130		55			53a 62b	23a					81					Traces of matting	38–59	Q.	1553
1554														✓			Ivory ring		Q.	1554
1557	140 190 110		340		F							24a 26e 45a 45c 65b 65c	7c 16b 30m(7) 36n 36s		95Z	Pebble		63–77	Q.	1557
1558	150 125 100		280	3??′″	M		24q 40d1 40q 45b1			41(2)		24a 65b 66a	30b(4)			2 quartzite hammer stones: 1 volcanicAsh hammer stone: 2 Basalt Grinders		63–64	P.	1558
1559	130 130 110		265		M.		46b			41		84 87a 94p	30b(2) 30c					73–76	Q.	1559
1560	190 160 105		265									81(2)						38–67	Q.	1560
1561	Diam.110105				C.	53c	42					4(2) 26c 69b 81 92						58	Q.	1561
1562	Diam.100200																Traces of wood		Q.	1562
1563	180 80 200		250		F.							69b						36–71	Q.	1563
1564	160 110 190		270				93d					22a 86g						40–70	Q.	1564
1565	205 140 180		250			53a	24g 24h 40e 93			24		24a					Pottery group	42–66		1565
1566	190 120 70		250		F	53a 53b 62b 74a1	24b 40e 40k				36a1 63	81(4)	7b	✓		2 small flints 1 large flint Polishing stone	Basketwork box S.W. end	42–59	Q.	1566
1567	100 50 105		205											✓						1567

TOMB REGISTER: PREDYNASTIC.—*continued.*

TOMB REGISTER: PREDYNASTIC.—*continued.*

Tomb No.	Graves N. E. D.	Loculus N. E. H.	Azimuth	Body Attitudes Pl. XII	Sex	Pottery *Pre. Corpus, Bad. Civ. & Pls. XXXII–XXVIII* B.	P.	F.	C.	W.	D.	R.	L.	Beads Pls. XXXVI–XLI	Slate Pls. XV & XIX	Stone Objects Pls. XVII–XXI	Miscellaneous and Remarks	S.D.	Disturbed	Tomb No.
1568	180 110 190		235							24		26c 66a 84e 84g 84h 92				Polishing stone		42–77	Q.	1568
1569	60 115 140		210		F.													44–61	Q.	1569
1570	125 70 110		235				24m(2) 40e1 82 1			42		1b 23b 65b				Flint core		62–64	Q.	1570
1571	120 180 150		360									6c			44H		Malachite adhering to palette	44–61	Q.	1571
1572	110 80		290											✓		Flint knife (frag.) Flint Blade	Resin or Gum Ivory gaming set and two stone balls		Q.	1572
1573	190 140 180		80				24m(2)			43b		84?	20			Ripple flaked flint		57–58	Q.	1573
1574												81p				Flint core				1574
1575	190 100 140		260			35d	24k				53a1	62 69b 94	7g				Matting under and over body: Fragments of wood and cloth	43–49	Q.	1575
1576	180 120 140		73				23					84d						60–64?	Q.	1576
1577	165 95 180		263			25f	23b 24m 24n			43b		33b 76d 84d						57–64	Q.	1577
1578	185 105 140		267				23b(2)				20q	24m 84d(2)						41–77?	Q.	1578
1579											22a	22a 23h(2)		✓		5 Shell Bracelets		35–80	Q.	1579
1580	220 150 170		245				40b			24		26c 36 66a(2) 66p 67 76g 84d		✓				53–70	Q.	1580
1581	90 200 190		345						44		8b	69h 94 1						50	Q.	1581
1582	120 120 100		255	2?1‴	C.	18f											Traces of matting over and under body		P.	1582
1583	200 120 140		235		F.		23d					21b 26f	19p 30k(4) 36s 40b(2)				Skull of Gazelle Bones of goat	65–77	Q.	1583
1590	170 145 155 170	155 80 55	260		M.		46a			56g	20p	24m 26f(2)	2a 19p 30g 30h(3) 40a 40b(2)					76–77	Q.	1590
1591	100 190 170		20		F.		24 1						30g(4) 43y	✓			Wood	68–78	Q.	1591
1592	190 100 140		250									84s	30p 36s 40b					77	Q.	1592
1593	140 95 100		270		M								30h(3)					76–77	Q.	1593
1594	140 75 150		265	4?2‴	C.							3a	30b(2)					58–64	P.	1594
1595	160 85 130		275	5?2‴	M.								16bb				Wicker sarir: straw canopy over body: matting: Linen		P.	1595
1596	130 100		271		F.	46 54a	24k					82		✓			Traces of reed and matting: Bed?	41–51	Q.	1596
1597(B)														✓			Ivory		Q.	1597 (B)
1598	150 90 120		230			44b	22c 24k 56a				1u	81 92					Traces of matting	44–48	Q.	1598
1599	110 80 100	110 35	260	2?2‴	C.	41e					31t	81					Traces of matting Spatha Rubens	38–67	P.	1599

TOMB REGISTER : PROTODYNASTIC.

Tomb No.	Grave N. E. D.	Azimuth	Body Attitudes Pl. XII	Sex	Pottery Pls. XXIX–XXX Tarkan I & II & Musta Gedda (*Brunton's Corpus*)	Beads XXXVI–XLI	Slate Pls. XV & XIX	Stone Vases Pls. XVII–XVIII: Alabaster	Limestone	Veined Marble	Brecciated Marble	Porcelainite	Slate	Volcanic Ash	Steatite	Breccia	Altered Gabbro	Rose Quartz	Miscellaneous and Remarks	Bricks Pl. XII & p. 25	S. D.	Disturbed	Tomb No.
1207	See Plan (Pl. V)				1a(6) $1a_2$ 1d $1d_1$(7) 1f(2) 1h(12) 1k(6) $1k_1$(15) 1*l*(5) $1l_1$ 1r 4c 5g 5k(2) 5l $7d_2$ 8g $14q_1$ 33n (2) $36d_1$(4) $37n_3$(2) 63o 66t(5) 67b(2) 68b 93p 100*l*(3) one of class 18	√	95k	1A K O R W 2D E F	1Q	1J		1U	1B F G N(3) P 2A 2B(2)	1E L T			1M	1S	3 copper axes Type 1 1 copper axe Type 2 1 copper fragment 3 Flints	√	80	Q.	1207
								See Text for untypable fragments															
1208	See Plan (Pl. V)				$1x_1$	√		1C D 4A(2) B(2) C	1I 3A	2G	V		1B C G 2F	2C	2C	1V			Flint Blade		80?	Q.	1208
								See Text for untypable fragments															
1210 1312	Unplanned 130 190 to 145 150	255	4J2″″	F.	3k 67j(2) 3g(2) 14m(2) $73h_2$ 81f 82g $86f_4$ $92l_4$	√	17T 97B												Shelf on N. & S. sides Pebble Malachite (frags. 30 cm. wide) Galena (frag.)		81 79–80	Q. N.	1210 1312
1317 1350	Hole 35 120 45 120? Loculus on South 120 70 65	235	4P1″″	C. C.	$41t_1$	√													Pot Burial			N. N.	1317 1350
1353	Diam. 40 35	345	3A5″′	C.	41t?	√													C. of 8 years Inverted Pot Burial			N.	1353

TOMB REGISTER : OLD KINGDOM AND FIRST INTERMEDIATE.

Tomb No.	Shaft N. E. D.	Chamber N. E. D.	on	Azimuth	Body Attitudes Pl. XII	Sex	Pottery *Qua & Badari II* and Pls. XXX–XXXI	Stone Objects	Beads Pls. XXXVI–XLII	Miscellaneous and Remarks	Coffin Sizes	Bricks Pl. XII & p. 25.	Dates Dynasties	Disturbed	Tomb No.

TOMB REGISTER: OLD KINGDOM AND FIRST INTERMEDIATE.

Tomb No.	Shaft N. E. D.	Chamber N. E. D.	on	Azimuth	Body Attitudes Pl. XII	Sex	Pottery *Qua & Badari II* and Pls. XXX–XXXI	Stone Objects	Beads Pls. XXXVI–XLII	Miscellaneous and Remarks	Coffin Sizes	Bricks Pl. XII & p. 25.	Dates Dynasties	Disturbed	Tomb No.
1201(A)	127 95 330	150 120 100	W.	90	6C2″	C.	4 Pots drawn Pl. XXX	Alabaster Table (broken)				✓	II	P.	1201(A)
1201(B)					2C1″?	F?									1201(B)
1204(B)	Not Planned									Painted Gesso			IV–VI?	Q.	1204(B)
1206	Not Planned						2 Sherds of Medum bowl & lip of lamp in same ware	Frags. alabaster calcita, marble vessels		Painted Gesso			IV–VI	Q.	1206
	C 200 200 1550														
1211							61N 68V			Pottery group			V		1211
1301(B)	120 125 300	230 125 100	S.W.	50						Rabbit and small sheep bones			IV?	Q.	1301(B)
1304		50 80 70		334	3A6	F.							II–IV	N.	1304
1306	128 128 120	128 245 360	N.	330		F.			✓				IV–V?	Q.	1306
1308	80 55 180	40 55 80	N.E.	270		F.	6E 13Y 77K(2)					✓	V		1308
1309(A)		40			8F10″	M.			✓	Inscribed wood coffin	160 50	✓	IV?–XI	N.	1309(A)
1309(B)	155 133 332	230 150 105	W.	270	6D9″	M.								N.	1309(B)
1309(C)		142					9F 9K 96X							Q.	1309(C)
		150							✓	Wood and coarse plaster coffin: Grains of wheat	188 50 32 4	✓		P.	
1310	170 135	205 (W88)	W.	45	8?9″	F.	4S1 6E 77L 77Q 90S1 96X						IV		1310
		119 230 145	N.	320	6H9	M.	4S1 90S1					✓		N.	
1311		110 50 85		252	6B9″	C.			✓	C. of 8 years			VII–X	N.	1311
										Wood coffin with plaster					
1313				50	6H1″					2 Spatha Rubens: 1 small brass wire ring (intrusive?): Wood coffin	182 55 18? 6–8		IV–VI	N.	1313
		Hole				M.									
1314		Hole 130		55	7G9″	M.	8M 69G			Wood coffin	150 40 22		VI	N.	1314
1315	185 65 170	185 57	N.	63			7Q 68S						V–VI	Q.	1315
1316		145 50 90		120	7?1″				✓				VII–X	P.	1316
1319		Hole		75	3A3″					Wood coffin	100 50 100		II–IV	N.	1319
1320		Diam. 37			2A9?				✓				IV	N.	1320
1322		Diam. 51							✓				VII–X	Q.	1322
1323	180 170 321	210 150 120	W.	40		M.	6C 7C 13R 77K 96X 13M 13O 71L 77N					✓	IV–V		1323
		251 141 95	E.												
		Pit													
1325		100 80		248	2B5″	M.?				Stones over body			II–IV	N.	1325
1326		60 35		256	2D2″	M.							II–IV	N.	1326
1330		140 70 160		230	4D6″	M.	77K			Wood coffin plastered in and out coarse white plaster	107 45 35 3–5	✓	V–VI	N.	1330
1331		Hole 80				M.	17K1			Old M. Pot Burial			IV	Q.	1331
1332		65			2A3″	F.				Wood coffin: stone chamber 55cm. high	100 40 20 4–5		II–IV	N.	1332
1335					2B2?	M.	17Q			Matting round body Pot burial			IV	N.	1335
1336		160 93 75		60	2B1″	M.				Wood coffin: Stone chamber 60 cm. high	107 55 35 3		II–IV	N.	1336
1340				350		C.?	19G			Pot burial: mouth of pot covered with mud brick and plaster			IV	N.	1340
1351				310	2A2?	F.	17K1		✓				IV	N.	1351
1352		95 202		35	2B1″	M.				Wood coffin	110 45 115	✓	V–VI	N.	1352
1354		135 120		254	2A1″	M.				Wood coffin	120 70	✓	II–IV	Q.	1354

TOMB REGISTER: MIDDLE KINGDOM.

Tomb No.	Dimensions	Azimuth	Body Attitudes Pl. XII	Sex	Pottery *Qua & Badari II* & Pls. XXXI–XXXV	Stone Objects Pls. XV–XXI	Beads—Pls. XXXVI–XLII	Miscellaneous and Remarks	Coffin Sizes	Date Dynasties	Disturbed	Tomb No.
1213	For Plan see Pl. VI				4B, C, D, E, G, Q, 8A, B1, B2, D, E1, F(3) F1(2), G(3), G2, L, M, 10A, B, M, 52C, F, 66B, H, O, 79E, H(2), J, V, Z, 79, 96B	Limestone Stela Offering Tables	√	These objects not connected with bodies		XI–XIII	Q.	1213
1213A		100	8A9″	F.		Albaster Pot	√	Wood coffin with coloured gesso: Bronze Mirror	45		P.	1213A
1213B		100	8F11″	M?				Traces of wrappings		,,		
								Body prone: Wood and plaster coffin: Traces of red and white plaster and wrappings		,,	P.	1213B
1213C		100										
1213D					Broken pot		√	Wood and plaster coffin	C40	,,	Q.	1213C
1213E							√	Traces of linen and plaster		,,	Q.	1213D
1213F								Wood and plaster coffin	160 40–45	,,	Q.	1213E
1213G		275	8F9″					Wood coffin		,,	Q.	1213F
1213H							√	Wood coffin	C150	,,	P.	1213G
1213I		35					√	Traces white plaster		,,	Q.	1213H
1213J		204					√			,,	Q.	1213I
1213K		204	8F?		Sherds			Traces wood & plaster coffin	45	,,	Q.	1213J
1213L		204			Sherds			Wood coffin	155 45	,,	Q.	1213K
1213M		204			Sherds			Traces of coffin		,,	Q.	1213L
1213N		204			Sherds			Traces of coffin		,,	Q.	1213M
1213O		204						Traces of coffin		,,	Q.	1213N
1213P		204						Wood coffin	C155 C40	,,	Q.	1213O
1213Q		204	8F11″?					Wood coffin	180 40	,,	Q.	1213P
1214	For plan see Pl. VI				3L, N, O4A, A1, B1, B2, F, H, H1, L, N1, 8B(2), B3, C(s), C1, D1, E, E2, F2, G(2), G1, H, K, L1, M, 10C, D, E, F(3)b, H, K, M(2), 11B(2), C, 37C, 52J, J1, M, M1, M2, 66M, 79B, F, K, O, Q, X(2), 96E, F, H, J, M, 98B Offering tables	Limestone Statuette painted Lid and top of kohl pot serpentine		Wood coffin Animal and human bones	45	,,	Q.	1213Q

TOMB REGISTER: LATE.

Tomb No.	Shaft	Chamber	On	Azimuth	Body Attitudes Pl. XII	Sex	Miscellaneous and Remarks	Bricks Pl. XII & p. 25	Dates	Disturbed	Tomb No.
1203	Not planned						Pottery coffins and frag. painted cartonnay		Græco-Roman	Q	1203
1204(A)	See 1204(B)					M.	Murdered tomb robber. Steel sword		About 1910 A.D.	N.	1204(A)
1301(A)	120 125 70			48		C.	Wood box plastered		Late	Q.	1301(A)
1302	180 100 150	100 20	N.	325		F.	Bones of dog in shaft: Human bones in Loculus		Late	Q.	1302
1303		45 145 100		325		M.		√	Roman?	Q.	1303
1305	110 105 300	95 210 100	N.	205		F?	Dog on bed of straw	√	IV re-used later	Q.	1305
1306	See 1306 in O.K. register					F.	Dog's skull Sherds.			Q.	1306
1307	50 210 10			208	8F9″′	F.	No type 162 2 sherds, one on each shoulder		Late	P.	1307
1597(A)	200 60 80			250	8F9″″	M.			Roman	N	1597(A)

TOMB REGISTER: DATE DOUBTFUL.

Tomb No.	Grave N. E D.	Azimuth	Body Attitudes P. XII	Sex	Beads Pls. XXXVI-XLII	Miscellaneous and Remarks	Disturbed	Tomb No.
1215	Not planned				√			1215
1318(A)	Hole 35	245	2A3″″	C.		C 7–8 years	N.	1318(A)
1318(B)			2B1″″	C.		C 9–10 years		1318(B)
1321	160 66	283	6A9″′	M.			P.	1321
1333	Hole 50	235	4D4″″	M.			N.	1333
1334	Hole 200	70		C.		3 molars irrupted	P.	1334
1422	73 50 40	263		M.	√		Q.	1422
1434	Hole	310	8F9″″	C.	√		N.	1434
1436	Hole	280	8F10″″				N.	1436
1450	45 180 70	215	8F9″′	F.			N.	1450
1456	110 90 110	280		F.			Q.	1456
1465	100 70 100	270				1 Sherd	Q.	1465
1515	100 70 70	275	3??″″				P.	1515
1562	Diam. 100 200					Traces of wood	Q.	1562

CHAPTER III

STONE OBJECTS

Predynastic and Protodynastic.

Vessels.

The most interesting of the few Predynastic stone vases is No. 1 on Pl. XVII, 1466 (38–48), the first on Fig. 1 of Pl. XV. This corresponds closely to Petrie's No. 130 (*Prehistoric Egypt*, Pl. XL). It is made of gypsum, not calcite, and is probably the anhydrous form, as it will not scratch very readily. This appears to be the first recorded use of this material for vases in the Predynastic period, for though Lucas (*Ancient Egyptian Materials and Industries*, p. 365, n. 4) says that Petrie found a Predynastic gypsum dish (*Prehistoric Egypt*, p. 36), Petrie himself states that it was of Protodynastic date. Miss Caton-Thompson says (*The Desert Fayum*, p. 106): " A bowl . . . in the Manchester Museum . . . proved to be of gypsum. One suspects that a number were probably of like substance, had the excavator attended to the point. Probably analysis of museum specimens would reveal a fairly large number ; and less slackness amongst Egyptologists in publishing their finds in detail, instead of ignoring what does not at the moment appear to be of importance, would almost certainly reveal more." She also gives a number of examples of vases labelled as " alabaster " (calcite) which proved upon examination to be gypsum. It is possible, therefore, that many other gypsum vases may exist. Some of the contents remained in this jar and a report on them by Professor Hilditch will be found on p. 141.

The Late Predynastic or Early Protodynastic vessels from 1205 are coarse and of normal type (Pl. XVII top row, Pl. XV, Fig. 1, lower row). The large group of drawings of Protodynastic bowls from 1207 and 1208 are reconstructions, with the exception of types 10, IE, IL, IJ, 2e, 3a, and 4a, and the accuracy of the forms cannot be guaranteed, though every effort was made to reconstruct them accurately.

In addition to the bowls shown in the drawings, fragments of the following vessels were found : two slate bowls, probably type 1n, and one probably type 1p ; one slate bowl probably type 2b ; ten alabaster bowls probably type 2f ; one alabaster bowl probably type 1f ; nine alabaster cylinder jars, type 4, one with a fine rope pattern near the neck, one with incised chevrons on top, and the remainder thick and coarse ; six alabaster vessels of unknown shape ; two of limestone of unknown shape ; one of veined marble and one of altered gabbro, making forty-nine stone vessels in all from 1207. In addition to those drawn from 1208 were fourteen bowls—six of limestone, six of alabaster, two of slate ; and five cylinder jars—two of alabaster, one of limestone, one of brecciated marble, and one of slate, making thirty-six stone vessels in all. The identifications were made with the help of Mr. Kirkaldy, whose report on some doubtful specimens will be found on p. 44.

The fine work of the vessels and the large variety of materials is most noticeable, and it is pointed out elsewhere that these tombs were undoubtedly those of persons of importance and

rank. Miss Caton-Thompson (*op. cit.*, p. 129) says : " As the function of the early dynastic grinders was to hollow out soft rocks, limestones and alabasters, by rotatory attrition probably aided by sand abrasive, it is surprising that the simple tool (a flint crescent drill) should not apparently be Predynastic in origin—the period of stone vases *par excellence*." Surely, however, it is in the Protodynastic period that stone vase-making reached its zenith, with the invention of the cranked drill with two weights for a " fly-wheel " shown in the tomb of Aba (*Deir el Gebrawi, I*, XIII). As a result of this, potting as a fine art was put out of business and, despite an occasional recrudescence, never recovered its old place in Egyptian culture. The groove round the base inside many of these bowls has not been explained, and it seems possible that it has something to do with the method of manufacture, which is probably not yet fully understood. The hardness of the stone employed for the vessels, its intractability (especially rose quartz), and the extreme thinness of some of the bowls lead one to believe that an elaborate, yet quick and efficient, technique must have been evolved. In 1207 alone there were fragments of no less than forty-nine separate vessels, in a dozen different materials. Though tomb 1207 had been robbed at least once, there can be little doubt that in the Protodynastic and Archaic periods the stone vases were deliberately smashed when they were put into the tomb, either to " kill " them or to discourage robbers. We understand that complete proof of this custom during the Third Dynasty will be forthcoming when the results of the recent excavations beneath the Step Pyramid of Sakkara are published.

Palettes.

Among the new types of Predynastic palettes, 28B may possibly be entirely separate from those classed as 28 in the *Prehistoric Corpus*, but it more probably belongs where it has been placed. It might represent a swimming drake. Type 44A is probably a Nile perch, and 140 a Nile turtle (see Mr. J. R. Norman's report on p. 45). The more interesting palettes are shown in Fig. 2, Pl. XV, and the others in Fig. 3 of the same plate. Drawings are on Pl. XIX.

There is no specimen among the Protodynastic examples which needs comment.

Flint Implements.

The flint implements from graves are drawn on Pls. XIX and XX, and photographs of them are given on Pl. XV, Figs. 4–6, and Pl. XVI, Fig. 1. The palæolithic types on the last figure may have been tools picked up and appropriated by Predynastic peoples, but the association is uncertain. The burial with the dead of plain flakes with no secondary trimming should be noticed ; examples are drawn and also shown in Fig. 4 of Pl. XV. These were also found in the Protodynastic tomb 1207. The group of four fine blades from 1413, one of which was broken before the burial (shown as a group in Pl. XIII, Fig. 3), is worthy of notice.

Fig. 7 of Pl. XV shows two groups of fabricators, from 1558 and 1536. With each group will be seen a piece of stone (? basalt) with a smooth surface which was certainly not used as a hammer. The purpose of these is at present unknown. The triangular piece of sandstone came from 1457, with the fine fishtail flint (see also Pl. XIII, Fig. 1). The sandstone had a red stain which was presumably red ochre. It does not seem possible to relate the two implements. The use of the fishtail flint remains a mystery. The resemblance to the Jewish instruments for circumcision is remarkable, but the distribution of the flints in graves will not support a hypothesis that they were used for this operation.

Miscellaneous.

The two hippopotami in pink limestone (Pl. XVI, Fig. 2) from 1451 were the most interesting stone objects from the dig. Describing these in *The Times* I said : " There is on the back of each hippo a curious erection, not unlike a form of howdah. This is not the lip of a vase, nor does it seem to serve any purpose. Hippopotami, apparently tethered and being fed by human beings, appear in one or two examples of painted pottery of the Predynastic period. There is a Badarian ivory vase in the form of a hippopotamus, with the lip projecting from the animal's back and giving a similar effect. Perhaps it is possible that they used these beasts for some form of transport ; though unless it was for transport in a marsh, it is difficult to imagine that they would be very convenient." Surgeon Rear-Admiral Charles M. Beadnell wrote suggesting that the ring might be a representation of the young on the back of the mother hippopotamus. He pointed out that the mother often carries her young in this way, and that the subject is a favourite one among Oriental artists. His theory is an attractive one, but it is hardly possible that the artist could have failed so hopelessly to give a representation of the young animal. Moreover, he would not have hollowed out the centre of the erection if it represented another animal.

Mr. G. D. Hornblower wrote pointing out that the phenomenon was not a new one in the prehistoric art of the Near East, and gave numerous references to published examples, including some from the early remains of Susa. He also said : " In that remote period tusks were used as vessels to hold precious articles brought from far distances, such as stibium and perhaps incense, and holes were pierced round the rim, or, in some cases, a groove cut below it, for tying on a piece of cloth or membrane as a cover ; some of the tusks were adorned at the tip with a carved figure of a hippopotamus, an animal sacred in some parts of Egypt. These vessels were themselves objects of high value, and were eventually taken as amulets, in view, probably, of the semi-sacred character of their contents. The long part of the tusk was discarded as cumbrous for amuletic purposes, but the original rim, with its holes, was retained, probably to preserve the connection with the original vessel ; thus we get the strange figure under discussion." Discussing a hippopotamus very similar to the Armant specimens in *J.E.A.*, XIII (Oct., 1927), p. 245–6, he says : " The little hippopotamus . . . has a special technological interest as pointing to a possible origin of the theriomorphic vessels so fully discussed by Mr. S. R. K. Glanville in *J.E.A.* XII, 52ff. Fig. 5 (a top view of the hippo) shows the manner of hollowing out the ring in the animal's back ; the surface within the ring is rough and unfinished, and forms a concave depression. Here, possibly, we may find an origin for theriomorphic vessels in stone, for it is but a step to continue the hollowing into the solid figure, which thus becomes a vessel. The tubular horizontal lugs would be an early addition, for purposes of suspension, and the holes in the rim, often unnecessary, especially in the larger vessels, would be suppressed."

This then gives a logical picture of decay followed by evolution. At the start there are the hollowed-out tusks, some carved with an amulet at the pointed end, a rim at the thick end to hold a cover, and holes for suspension. Later some other vessel is used for carrying materials and the tusks remain only as amulets, the carving at the bottom increasing in size at the expense of the body of the vessel, which disappears except for the rim with suspension holes. Next, the hollowing of the rim is deepened to make a vase inside the body of the amulet, the suspension holes are eliminated, and lug handles substituted. But there are difficulties in accepting this account of the phenomena. In a series showing decay of form it is not essential to have a sequence chronologically perfect, for copying by poor or lazy craftsmen may soon produce, in one

place, a decadent form, that may not appear till much later in another place, where the craftsmen are more patient ; nevertheless, some order relative to the process of decay or evolution must be shown, but the reverse is the case with these objects. In the British Museum (No. 63057) is an ivory theriomorphic hippo vase of E.P.III (Badarian) date, with a plain everted lip without suspension holes, and theriomorphic vases continued into the First Dynasty (Glanville, ibid.). Since the E.P.III vase cannot possibly be evolved from the later tusks with amulets, or amulets with rings, these must surely be regarded as a separate series. It may also be said that the increasing of a small hollow to make a vase is quite contrary to the general run of developments in Egypt, where almost everything appears as a fully-fledged useful invention and slowly atrophies. Even the development of the pyramid from the mastaba is hardly a parallel case.

The hippopotami with rings, from Armant, are unfortunately not dated. Nor is the specimen described by Mr. Hornblower in his article in *J.E.A.* There are four examples from Diospolis Parva (Pl. V, B101) which Petrie dates (*Prehistoric Egypt*, p. 34, par. 80) to S.D. 34, and an example of a tusk, with a small hippo carved on the end, from Mahasna (*Predynastic Cemetery at El Mahasna*, p. 27, Pl. XIII, Fig. 2) is dated to before 41. The two sets of objects appear therefore to be contemporary. But, if the above arguments are sound, and the hippopotamus with a ring is not descended from the hippopotamus on the tip of a tusk, we are no nearer a solution of the question of the origin of the ring, but it does leave us free to consider this independently of the tusks. It may be remarked that the hippopotamus occurs in other forms in Predynastic art ; on C ware pottery, both drawn and modelled, as slate palettes, and on the handles of ivory objects, so there is no necessity to postulate any connection between two objects carrying this representation.

In the group from Diospolis Parva (B101) were included three hollow limestone conical pendants, the rings of which are very similar to those on the hippopotami. These pendants are found together with leather, leather thongs having, apparently, been threaded through the holes. Petrie suggests that the cones " might belong to leather water skins as plugs to stop the holes of the limbs " (*Prehistoric Egypt*, ibid.). On p. 12 he mentions a hippopotamus as a plug pendant at S.D. 45 from Naqada, grave 1475, but this is unpublished. It is difficult to see how the hippopotami could have been used for this purpose, but they may have been suspended from a leather dress for decoration, as hunting trophies, or as amulets. However, the ring with four or more perforations is unnecessary for suspension, a single loop of stone being sufficient, and even if more threading were necessary there would be no need to hollow out the lump on the animal's back.

The problem might be solved if more could be discovered about the place of the hippopotamus in the lives of the people of Prehistoric Egypt. Amongst the bones from Kôm W of the Neolithic Fayum A-group were a phalange and calcined ulna of a hippo and also four tusks. Miss Caton-Thompson says : " It seems safe to assume that the creature was used for food " (*The Desert Fayum*, p. 34). There were no hippopotamus bones in the settlement at Badari (*Badarian Civilization*, p. 77). In the settlement at Bet Khâllaf (Garstang, *Mahasna and Bet Khâllaf*, p. 8) " fishes and small animals were used as food." There is no report on the animal remains in the Ballas settlement (*Naqada and Ballas*). The full zoological report on the bones from the Maadi settlement has not yet been made, but the hippopotamus was not amongst the number of animals recognised to have been eaten at the time of the publication of the preliminary report (*The Excavations of the Egyptian University in the Neolithic Site at Maadi*, Oswald Menghin and

Mustapha Amer[1]), though Junker reports hippo from Maadi and Beni-Salame (*Anzeiger der Akadamie der Wissenschaften in Wien*, philosophist. Klasse, Nr. XVI–XXVII, 1933, p.88). Hippopotamus and crocodile bones were reported from Merimde Beni-Salame, the identification of the former resting on a thigh-bone from " the larder " of CO. (O. Menghin in H. Junker, *Grabungen auf der Neolithischen Siedlung von Merimde Beni-Salame*, p. 218). There was none in Settlement 1000–1100 at Armant. At Toukh (J. de Morgan, *Recherches sur les Origines d'Egypte*) none was found. The evidence that the Predynastic peoples ate hippopotami is therefore slight, resting on three bones only[1], two from the Fayum and one from the West Delta, though, as we have seen, the animal is very frequently portrayed by them in various forms. Most interesting is the representation of man in connection with the hippos drawn on pots, especially that from a design (A) on a pot in the Metropolitan Museum, New York, published by myself in *J.E.A.* XIX, May, 1933, p. 55, Pl. XI. Here the man appears to be leading the hippopotamus by rings in the nose or perhaps feeding it. Next (B), there is a pot from El Mahasna (*Predynastic Cemetery at El Mahasna* Pl. XXVII, Fig. 13) which is described by the authors as follows (p. 35) : " On the inside we find details of a hunt. The hunter, with hair streaming in the wind, and dressed only in a short kilt, has just speared a hippopotamus which is standing in a pond, the young hippo standing near. On the other side of the pond is another hippopotamus, also speared, and the hills of the desert, or clouds, appear in the background." Further details, that may be added to the above glowing account, are that in the drawing the man who is said to be " spearing " the hippo is not shown to be in any way connected with it. A little to the front of his chest is a curious object consisting of a double circle, from which a chain, or a double rope, or a staff with a rope round it, passes to the head of the hippo. A similar double circle, apparently on the ground, is joined to the head of the second hippo by a double rope or by a staff with a rope twisted round it. It is possible that these are harpoons, connected with a circular floating object of some weight, with which the animal could be caught after it had exhausted itself. They might also be traps, but comparison with the traps shown on C 94 (*Prehistoric Corpus*, Pl. XXV) and in the painted house (or tomb) at Hierakonpolis (*Hierakonpolis II*, Pl. LXVI) shows this to be unlikely. The types of traps shown there are known to-day in Africa, one being the " ring trap " (see C. W. Hobley in the *Journal of the Society for the Preservation of the Fauna of the Empire*, Sept., 1934, p. 20). The " pond " resembles a fence rather than water. Another bowl (C), showing a scene with men and hippopotami is published in *Mahasna and Bet Khallâf*, Pl. III, Figs. 1 and 2, and *Pre. Corpus* C. 5 s (the photograph should be examined for details of the design). At the top is a man standing holding the same curious double circle, from which a line passes to, or behind, the buttocks of a hippopotamus. Another animal is standing free on the right of the bowl facing the first. Behind the man holding the double circle is a design which I suggest is a conical trap, narrowing from a wide entrance to a point. To the side of this are two men with arms outstretched, and walking into the trap is a crocodile. Between the two men and the rear of the second hippopotamus is a patch of water, with what is possibly the top of another trap behind it. Above the hippopotami are two objects which might be barbed harpoons or some form of vegetation. The same design appears on the outside of the bowl (B) from El Mahasna, previously described. Another portrayal of the same object on a different pot from the same cemetery (C 49 s *Pre. Corpus*, Pl. LXI) makes

[1] *The Second Preliminary Report* mentions hippopotamus bones (p. 53) but Professor Amer tells me that the limb bones were found buried upright in the ground outside the houses in a manner that suggested sacrifice rather than ordinary consumption for food.

it appear that it is unlikely to be a harpoon. In *Musta Gedda* (in the press, by kind permission of Mr. Brunton), Pl. XXXIV, pot 30, from tomb 1805, there are two tethered (?) hippopotami on opposite sides of the pot. The lines to the hippos, in one case to the head and in the other to, or behind, the buttocks, have the same double circle and are of the same chain-like manufacture. Between the hippos is water and the curious harpoon-like design mentioned above. Here the design is double, the points meeting at an inverted V which might be a gate. There are also circles with radiating points. The harpoon-like design also occurs on the outside of pot 24 from 11700 on the same plate. There is one more pot (D) to be noticed before suggesting an explanation, C 5 m (*Pre. Corpus*). This shows in the centre a crocodile, at the top what are probably the walls of a trap, to the right of which are seen in the distance (?) two men with outstretched arms. At the bottom of the drawing are three free hippopotami standing in water (?). There are other pots showing the trapping of crocodiles without the presence of hippopotami, C 100 e and perhaps C 5 d, but none showing hippopotami in a trap or being trapped. D 78 a perhaps shows crocodiles being harpooned. See the harpoon (?) at the top of D 45 m.

Before putting forward a hypothesis about the place of the hippopotamus in Predynastic life, here is a résumé of the facts so far ascertained.

(1) Though tusks are common, the evidence for eating the hippopotamus rests upon only three bones[1], two belonging to the Fayum A-group culture, and one to Merimde in the Delta.

(2) In the different scenes usually regarded as being hippopotamus hunts, the " spear " is always the same and is quite different from that used for deer and antelope (see *Hierakonpolis II*, Pl. LXXVI mid. bottom register), and from the harpoon used for crocodiles.

(3) In one scene a man appears to be leading or feeding a hippopotamus.

(4) There are scenes of crocodiles being trapped which show no hippopotami, but the converse is not found. In two scenes showing traps and both animals, the crocodile is in the trap or walking into it, and the hippos are on the opposite side of the trap to the men.

Now, with the exception of (3), there is nothing here that can be held to disprove that the hippopotamus was hunted for its food and other products, a special form of harpoon being used, but a second hypothesis, that the hippopotamus was domesticated by man, and used by him in his war with the crocodile, will cover all the facts. It is suggested that in the trapping scenes on (C) and (D) the hippopotamus is being used on the river side to hem in the crocodiles, and that the special " harpoons " are, in fact, tethering apparatus. The animals on (B) appear rather to be tethered than harpooned. In support of this hypothesis the following further facts may be adduced :

(5) The position of Thoueris (the hippopotamus goddess) in Egyptian religion : " Bes is only one of a number of male and female demons . . . half animal and half human, who . . . fight with knives and bows against adversaries or strangle serpents and lions. And it is as a protection against such evil beings that Bes is particularly confided in. His wife is Thoueris, the favourite of the people. Her name signifies merely *The Great One*. She is a hippopotamus standing on her hind feet. She holds the hieroglyphic sign *protection*, and thus shows what was expected of her." (Adolf Erman, *A Handbook of Egyptian Religion*, trans. by A. S. Griffith, London, 1907.)

[1] *The Second Preliminary Report* mentions hippopotamus bones (p. 53) but Professor Amer tells me that the limb bones were found buried upright in the ground outside the houses in a manner that suggested sacrifice rather than ordinary consumption for food.

(6) The position of the crocodile as an evil being, and as a destroyer, needs no stressing. It is patent in the " Cippi of Horus ", and in the literature. The worship of the crocodile-god Sebek centred in the Fayum, where we find evidence of the hippopotamus having been eaten.

Miss Caton-Thompson stresses particularly the fact that the Fayum people were agricultural and not pastoral. It appears that they had no domestic animals, but large areas under crop, and hunted for their meat. (*The Desert Fayum*, p. 89.) The hippopotamus is a destroyer of crops, the crocodile of flocks and herds when they go to water. The Upper Egyptians of comparable date with the Fayumis were certainly partly pastoral.

(7) " From all accounts the hippopotamus is averse from stepping over any obstacle, and the slightest impediment that it recognises as artificial is sufficient to hold it back or cause it to change its path. The presence of crocodiles in their favourite pools is quite a common occurrence, and they do not mind these reptiles being in their vicinity except during the breeding season, when the crocodiles seem to move away by a tacit understanding, lest they should be driven off by the cows, which are usually vicious at such periods." (Marius Maxwell, *Stalking Big Game with a Camera in Equatorial Africa*, London, 1925.) Thus by tethering, or fencing, the Predynastic Egyptians could have confined the hippopotami to a particular stretch of water, which, at least throughout the breeding season, would have been free of crocodiles, and safe for the watering of man and beast. Feeding the hippopotami would no doubt tame them sufficiently to free the people from danger of attack, and domestication might quite easily increase the possessive instincts of the animals sufficiently to make them exclude the crocodiles at other times than the breeding season. There can be little doubt that the Ancient Egyptians could have tamed the hippopotamus, since the Dynastic peoples succeeded with the crocodile. It is possible that, with a little manœuvring the cow hippo could be persuaded to participate in an attack on crocodiles. Mr. C. W. Hobley tells me that he has seen a fight between a hippopotamus and a crocodile in which the former held the field.

Enough has been said to show that a case can be made out for the domestication by the Predynastic Egyptians of the hippopotamus, or at least for its confinement to certain areas during the breeding season. At the present time there is not enough evidence to accept the hypothesis as proven, but it is to be hoped that new finds and a closer examination of all published and unpublished material may make it possible to settle the matter.

It is, of course, not suggested that this attitude towards these beasts extended into the Dynastic period. As agriculture grew more intensive, and as weapons for the destruction of crocodile improved, the need of the people for protection would decrease, and the hippopotamus would become a menace to the crops.

A small but interesting object is the alabaster parallelepiped from 1538 of S.D. 57–61, Pl. XVIII, Fig. 5. This has kindly been weighed for us by C. R. Bailey, Esq., of University College, London, and it is 4·1265 grammes (63·6 grains). This may well be a half Daric weight, since the Daric is known from S.D. 40 in Egypt (see Petrie, *Pre. Egypt*, p. 28 and *Measures and Weights*, p. 16, who gives the median weight for the Daric at that date as 125·5 grains ($\frac{1}{2}$=62·75).)

Archaic.

The stone table, drawn on Pl. XVIII and photographed on Pl. XVI, Fig. 3, is of a fairly common type. It is made in two parts, of hard limestone, containing pockets of hard, orange-coloured clay. " They (the stone tables) were always made of alabaster ; in some cases the stem was cut in one block with the table ; in other cases it was a separate piece, attached sometimes by cement " (J. Garstang, on the Third Dynasty tombs in *Mahasna and Bet Khâllaf*, p. 17). A table separate from its stand is shown by Petrie and Brunton in *Sedment* I, Pls. V and VI, tomb 1356 (Second and Third Dynasties). This was made of pink limestone.

Old Kingdom and Middle Kingdom.

Whilst a road was being made along the concession, two palettes and two pebbles were found underneath a boulder about three kilometres to the south of the house. There were no other remains with them. The palettes are shown on Pl. XIX and Fig. 3 of Pl. XV. One was of gabbro and one of limestone, while both pebbles were of gabbro. By the form of the gabbro palette, the group probably belonged to the " Pan-grave " people of the Middle Kingdom. It is curious the number of caches of odd objects like these that are found in the Low Desert and the edge of the High Desert. In addition to the above, we discovered near the house at Armant, two Fifth Dynasty pots, buried mouth-down in the desert, without any traces of human activity near them. On the edge of the High Desert we found a Roman or Coptic amphora leaning against a boulder, where it had been left fifteen hundred or more years ago. At Mustagedda, in the big wadi, a decorated pot lay in fragments in the shade of a big boulder, where its owner had broken it, no doubt while resting on his way up to one of the hermit's dwellings ; the smallest fragments had not been washed ten yards by the storms of the last thirteen hundred years. It was possible to estimate, within an hour, at what time of day the pot was broken, and it was not difficult to guess the unchristian language that probably followed the accident, since the spot was a good two hours' hard walking from the nearest water. These solitary and mute witnesses to human cupidity and accident strike a more personal and human note than the thickly clustered remains of burial grounds and villages.

Middle Kingdom.

The alabaster jar from 1213, Pl. XVIII and XIV, Fig. 5, is less waisted than is normal for this type of vessel in the Middle Kingdom. A straight-sided example (No. 82, Pl. XLVII, *Harageh*, Engelbach and Gunn) is Second Intermediate, but this has a foot.

The limestone statuette from 1214, though not inspiring, is an interesting example of provincial art. Two views of it are given in Fig. 4 of Pl. XVI. It is 7·8 cm. high, by a maximum width of 2·7 and a maximum depth of 4·7. The colouring is worn, but the body has been red, the wig black, the eyes black and white (natural stone), the dress white (natural stone) and the chair black and red, but it is not possible to distinguish the pattern. The suggestion, at first sight, of grim humour in the portraiture, is due only to the inefficiency of the " artist " (executant would perhaps be a better word), who evidently had but the crudest knowledge of his craft. The implication of this object is better considered conjointly with that of the stela from 1213.

The stela (Pl. XVI, Fig. 5) is in limestone, painted in black, red and yellow, with portions of the stone left white. The figures are also slightly in relief, and one or two details are shown by scratches. The stone is 41·7 cm. × 33·3 cm. (mean of three determinations each) × about 5 cm., and 7·5 cm. where the top curves forward. The relationship between height and width is just as 5 : 4, which looks as if a unit of length were used in manufacture, but the stela is very roughly cut, the probable error on the figures for length and width being in the neighbourhood of ± 2 cm., so this exact proportion is largely accidental. The construction of the stela might

possibly be 5/8 Great cubits × ½ Great cubit, the Great cubit having been found in the Middle Kingdom at Lahun (66·07 cm.) but not divided binarily.

The execution of the relief and painting could hardly be more barbarous, and the most that can be said for it is that to the modern mind this naïve impossibility is less offensive than the smug superficial competence of the Romano-Egyptian or Victorian periods.

Though the date of the two tombs is slightly uncertain there is little doubt that they lie between the Eleventh and Twelfth Dynasties, one of the peak periods of Egyptian art, though they might be of Second Intermediate date. Nor is the explanation that the art is provincial altogether satisfactory, for the tombs lie very close to the centre of the Middle Kingdom civilization, within a few hours' walk of the capital, and it is amazing that the local artists should have been still in the dark ages of the First Intermediate period. Admittedly the owners were not people of great wealth, but to have such tombs at all they must have been at least of local importance. Only further excavation of the large series of Middle Kingdom tombs at Rizeikat can hope to elucidate the problem. The stela of Henenu (Peet, *Cemeteries of Abydos*, II, Pls. XXXIII, Fig. 1, and XXXV) shows a similar but less pronounced barbarity.

The inscription from the stela has been copied by Fairman, who reads it as follows :

" (1) An offering which the King gives to Osiris, Lord of Busiris, Great God, Lord of [Abydos], that he may give (2) ' coming-forth-at-the-voice ' offerings of [bread, beer], cattle, [birds, clothing] . . . every good and pure thing, for the revered one *Mnïw* . . . ? (3) born of Renefankhu, [his ?] mother. . . ." In the usual way, the interesting part of the inscription, the name, is partly destroyed, and there is no title that might be of some interest. Messrs. Ilford Ltd. very kindly photographed this stela in a number of ways to see if it were possible to obtain more of the inscription than was visible to the naked eye. Infra-red, ultra-violet, and X-rays were all tried, but without obtaining any improvement on the original photograph.

O. H. M.

Some Fragments of Stone Bowls From Ar. 1207

By J. F. Kirkaldy, M.Sc.

No. 20 is a very much altered gabbro, a basic plutonic igneous rock, which has been subjected to pressure so that nearly all the original minerals have altered into new forms.

No. 30 is also a gabbro, not nearly so much altered, but showing distinct signs of intense pressure.

No. 29 is a quite normal limestone. I am afraid that the white crust in which you were interested has all disintegrated in the making of the slide. (The white crust was almost certainly formed by fire.—O. H. M.).

Dr. M. McGregor, our petrologist, has also examined the slides and agrees with these determinations.

Remarks on The Shapes of Some Slate Palettes

By Mr. J. R. Norman

I am afraid that it is quite impossible to recognise the animals depicted by the palettes with any degree of certainty, and Nos. 44H and 46S are quite unidentifiable. It is possible that No. 44A may represent the well-known Nile Perch or Bolti, *Tilapia nilotica* (Linn.), which is quite frequently depicted in Egyptian mural decorations. My colleague, Mr. H. W. Parker, tells me that 140 may possibly represent the Nile Turtle, *Trionyx triunguis* (Foorsk.) but that this is only in the nature of a guess.

REGISTER OF STONE OBJECTS

Object	Type	Material	Size	Fundplatz	Date	Refs. in Text and notes	Illustrations Φ	Illustrations △	Distribution
Vases			*Ht. Max. Wth.*						
Vase		Gypsum	8·3 × 5·8	1466	S.D. 38–48	p. 36	XV 1 1, XIII 6	XVII 1	Ashmolean
,,		Breccia	2·4 × 3·2	1357	,, 44–64			,, 2	Buried
,,		Limestone (Bk.)	4·2 × 5·5	1550	,, 57–64		XV 1 3	,, 3	Toronto
,,		Alabaster	12·2 × 8·1	1205	Late Pre.		XV ,, 4, XIV 3	,, 4	,,
,,		,,	4·1 × 5·8	,,	,, ,,		,, ,, 6, ,, ,,	,, 5	,,
,,		Limestone	4·4 × 8·7	,,	,, ,,		,, ,, 5, ,, ,,	,, 6	,,
,,		,,	1·4 4·6	1300	Pre.			,, 7	Buried
Frags. bowls		Various	*Various*	1207, 1208	S.D. 80, 81	pp. 36 & 44		XVII–XVIII	Toronto
Table and stand		Limestone	11 36	1201	Dyns. II–III	p. 42	XVI 3	XVIII	,,
Vase		Alabaster	6·7 7·2	1213(A)	,, XI–XIII	,, 43	XIV 5	,,	,,
Top and lid of Kohl pot		Serpentine ?	1 4·3	1214	,, ,,		,, 4		,,
Miscellaneous			*Ht. Length*						
Hippopotamus		Limestone (Pk.)	4·7 5·8	1451	Pre.	pp. 38–42	XVI 2	XXI	Toronto
,,		,, ,,	4·4 5·5	,,	,,		,, 2	,,	,,
Mace head		,,	2·2 6·3	1300	EarlyPre.(E.P.IV)?		XV 1 2	XVIII 1	Queen's Coll. Ox.
,, ,,		Breccia (Pk.)	4 5·3	1500	Middle Pre ?		,, ,, 7	,, 2	Toronto
Weight ?		Alabaster	c 1 c 2·3	1538	S.D. 57–61			,, 5	Queen's Coll.
			Width						
Statuette		Limestone	7·8 2·7	1214	Dyns. XI–XIII	pp. 43–44	XVI 4		Toronto
Stela		,,	41·7 33·3	1213	,, ,,	,, ,,	,, 5	XXI	,,
Model column		Alabaster	4·4 1·6	1300	Roman ?			XVIII 4	Lost
			Diam. Th.						
Bangle		Slate (Bk.)	9 0·8	Ar. X	?			XVIII 3	Lost
Palettes			*Length Max. Wth.*						
,, (Turtle)	14O	Slate	12·0 11·1	1466	S.D. 38–48	p. 45	XV 2 8, XIII 6	XIX	Ashmolean
,, (Duck ?)	28B	,,	19·2 14·0	1402	,, 35–40		,, ,, 7	,,	Cairo 57560/1
,, (Perch)	44A	,,	13·6 8·4	1431	,, 62–63	p. 45	,, ,, 4	,,	,, 57563
,, (Fish)	44H	,,	14·5 9·0	1535	,, 44–45		,, ,, 3	,,	,, 57562
,, ,,	,,	,,	14·6 9·1	1571	,, 44–61		,, ,, 5	,,	Toronto
,, ,,	46S	,,	16·0 10·3	1531	,, 39–61		,, ,, 2	,,	,,
,, ,,	,,	,,	12·1 8·5	1513	,, 63–64		,, ,, 1	,,	,,
,, (Diamond)	91P1	,,	27·8 10·8	1459	,, 33–73		,, ,, 3	,,	,,
,, ,,	91R1	,,	26·4 9·2	1202	Late Pre ?				Buried
,, ,,	91P	,,	21·4 9·0	1411	S.D. 42–44		XV 3		Ashmolean
,, ,,	*Bad. Civ.* 5	,,	38·4 10·5	1424	Pre		,, ,, XIV 2		Toronto
,, ,,	91Q	,,	32·0 11·2	1421	S.D. 36–44				Buried
,, ,,	*Bad. Civ.* 6	,,	c 32 c 9	1427	S.D. 39–42			XIX	,,
,, ,,	,, ,, 5 ?	,,	c 20+ c 9	1484	Pre.				,,
,, ,,	90D	,,	c 74 c 12	1401	S.D. 31–58				,,
,, ,,	91B	,,	21·0 6·7	1405	,, 37				Queen's
,, ,,	,,	,,	c 21 c 5·5	1481	,, ,,		XV 3		Buried
,, (Trapezoidal)	87F	,,	9·1 6·7	1346	S.D. 77–78		XV 3		Toronto
,, (Rectangular)	94A	,,	20·4 11·1	1205	Late Pre.		,, ,, XIV 3	XIX	,,
,, (Amorphous)	95Z	,,	16·3 9·1	1557	S.D. 63–77		,, ,,	,,	,,
,, (Frag.)	,,	,,		1539	,, 52–65				Buried
,, (Bird)	*Bad. Civ.* 20	,,	9·1 7·2	1400	Pre.		XV 2 6		Queens
,, (Circular)	Proto 17T	,,	Diam. 8·7	1312	S.D. 80		,, 3 XIV 1	XIX	Ashmolean
,, (Rectangular)	,, 97B	,,	9·9 7·9	,,	,, ,,		,, ,, ,, ,,		,,
,, ,,	,, 95K	,,	12·3 7·3	1207	,, ,,		,, ,,	XIX	Toronto
,, ,,		Gabbro	12·8 9·4	Ar. X	Nubian	p. 43	,, ,,	,, Nub. 1	Cairo 57557/9
,, (Amorphous)		Limestone	14·0 6·8	Ar. X	,,		XV 3,	,, Nub. 2	,, ,,
Pebbles									
Pebble		Quartz	c 6·5 4·5	1424	Pre.		XIV 2, XV 3		Toronto

REGISTER OF STONE OBJECTS—*continued.*

Object	Type	Material	Size	Fundplatz	Date	Refs. in Text and notes	Illustrations Φ	Illustrations △	Distribution
Pebbles			*Length Max. Wth*						
Pebble		Quartz	c 6 2	1421	S.D. 36–44				Held
,,		,,	c 5 3	1402	,, 35–40		XV 2		Cairo 57560/1

„ „	„ 95K	„	12·3 7·3	1207	„ „		„ „	XIX	Toronto
„ „		Gabbro	12·8 9·4	Ar. X	Nubian	p. 43	„ „	„ Nub. 1	Cairo 57557/9
„ (Amorphous)		Limestone	14·0 6·8	Ar. X	„		XV 3,	„ Nub. 2	„ „
Pebbles									
Pebble		Quartz	c 6·5 4·5	1424	Pre.		XIV 2, XV 3		Toronto

REGISTER OF STONE OBJECTS—*continued*.

Object	Type	Material	Size	Fundplatz	Date	Refs. in Text and notes	Illustrations Φ	Illustrations △	Distribution
Pebbles			*Length Max. Wth*						
Pebble		Quartz	c 6 2	1421	S.D. 36–44		XV 2,		Held
„		„	c 5 3	1402	„ 35–40		„ „ XIII 6		Cairo 57560/1
„		„	c 4 2·5	1466	„ 38–48		„ 3		Ashmolean
„		„	c 7 3	1541	„ 58–62		„ „		Queens
„		„	c 5·5 4	1550	„ 57–64		„ „		Toronto
„		„	c 5 3	„	„ „		„ „		„
„		„	c 4 3·5	1557	„ 63–77		„ „		„
„		„	c 5 4	1548	„ 38–67	Malachite in-ground	„ „		„
„		„	not taken	1535	„ 44–45				Cairo 57562
„		„	c 6·5 3	1547	„ 48–63				Held
„		„	c 5·5 3	„	„ „				„
„ (2)		„	c 4 3	„	„ „				„
„		„	c 4 2·5	„	„ „				„
„ (2)		„	c 3·5 2·5	„	„ „	Malachite in-ground on one			„
		„	c 4·5 3·5	1566	„ 42–59				Ashmolean
„		„	not taken	1568	„ 42–77				Buried
„		„	c 6 3·5	1457	„ 35–53				Held
„		„	c 7 3·5	1481	„ 37				„
„		„	c 6 4	1522	„ 57–66				„
„		„	c 5·5 4·5	1567	Pre.				„
„		„	c 5·5 3	1312	„ 80		XV 3. XIV 1		Ashmolean
„		„	c 5·5 2	Ar. X 35	Nubian		„ „	XIX Nub. 3	Cairo 57557/9
„		„	c 6 2	„ „	„			„ „ 4	„ ?
Cosmetics[1]									
Mineral		Malachite		1481	S.D. 37				Toronto
„		„		1565	„ 42–66				„
„		Limonite		1547	„ 48–63				Ashmolean & U.C.L.
„		Malachite		1550	„ 57–64				Toronto
„		„		1400–1500	Pre ?				Queens
„		Galena		1312	S.D. 80		XIV 1		Ashmolean
Implements									
Flake-blade (with alternate retouch on edges)		Flint	16·5 3·1	1413	S.D 32–43	p. 37	XV 6, XIII 3	XX	Toronto
Finely denticulated bifacial knife		„	12·6 4·5+	„	„ „		„ „ „	„	„
Thin bifacial sickle		„	12·7 3·2	„	„ „		„ 5 „	„	„
Thin lozenge-shaped bifacial knife-blade		„	16·5 3·5	„	„ „		„ 6 „	„	„
Pesh-kef (fish-tail knife)		„	12·0 6·6	1457	„ 35–53		„ 5, XIII 7	„	Queens
Rectangular sickle-blade (with back and ends trimmed inversely)		„	7·4 2·7	1481	„ 37		„ 6	„	Toronto
Flake (simple)		„	7 3	1466	„ 38–48		XIII 6		Ashmolean
„ „		„	2·2 0·8	1499	„ 38–66		XV 4	XIX	Toronto
„ (inversely retouched on both edges)		„	5·8 3·7	1524	„ 38–67		„ „	„	„
„ (chip)		„	3·9 1·5	„	„ „		„ „	„	„
„ (slightly touched)		„	5·2 2·7	„	„ „		„ „	„	„
„		„	2·5 1	„	„ „		„ „	„	Lost
„		„	3·6 2·3	1527	„ 41–67		„ „		Manchester
„ blade (with alternate retouch on edges)		„	12·2 2·8	1566	„ 42–59		XV 6	XX	Ashmolean
„ (slightly touched)		„	3·0 1·6	„	„ „		„ 4	XIX	„
„ (simple)		„	3·4 1·1	„	„ „		„ „	„	„
„ „		„	5·6 1·5	1423	„ 44–57		„ „	„	Toronto
Pesh-kef (fish-tail knife)		„	11·4+ 5·6	1523	„ 48–53		„ 5	XX	„
Adze (or tranché axe)		„	5·6 5·2	1539	„ 52–65			XIX	Manchester
Core		„		1359	„ 53–65			XVII	„
Ripple knife		„	19·1 5·0	1573	„ 57–58	16 teeth to the cm.	XV 5	XX	Ashmolean

[1] Records of cosmetics buried will be found in the tomb register.

REGISTER OF STONE OBJECTS—*continued.*

Object	Type	Material	Size	Fundplatz	Date	Refs. in Text and notes	Illustrations Φ	Illustrations Δ	Distribution
Implements			*Length Max. With*						
Frags. round base ripple laurel-knife		Flint	6 / 5·5 / 5·5 / 3	1530	„ 57–58		XV 5		Toronto
Core		„	7·3	1570	S.D. 65–67		XVI 1	XIX	Manchester
Flake		„	8·8	1208	„ 80		XV 4	„	Toronto
Utilised flake		„	6·4	1207	„ „		„ „	„	„
Flake (simple)		„	5	„	„ „		„ „	„	„
„ knife (with trimmed tip)		„	5·8	„	„ „		„ „	XVII	Manchester
Core (Levallois)		„	9·9	1300	„ „			„	„
„ „		„	10·3	„	„ „			„	„
Axe		„	7·1	„	„ „			„	„
Bifacial point (spear head?)		„	11·8	700	„ „			„	„
„ „ „		„	8·5	„	„ „			„	„
Hollow-base (forked) arrow head		„	6·3	1300	„ „			„	„
Point		„	8·4	„	„ „			„	„
Chip		„	3·1	1348	Pre.		XV 6	XX	Ashmolean
Flake knife (with retouch on edges and tip)		„	3·5	1500	?		„ 4	„	„
Rippled knife (frag.)		„	2·2	1537	„		„ 5	XIX	Toronto
		„	8·0	1572	„	11 teeth to the cm.	„ „	XIII 4	
		„	4·8	„	„		„ 4	XIX	Manchester
		„	3·9	„	„		„ „	XVII	„
Flake		„	5·5	„	„				„
Core (Levallois?)		„	1·3	„	„				„
Point (large bifacial)		„	6·8	1574	„				„
Fine bifacial leaf knife		„	11·9	700	„				„
Bifacial knife (frag.)		„	5·3	„	„				„
Bevelled axe		„	9·9	„	„				„
Utilized flake		„	2·8	„	„				„
„ „		„	5·6	„	„				„
„ „		„	4·4	„	„				„
„ „		„	8·2	„	„				„
„ „		„	2·3	„	„				„
Retouched „		„	7·8	„	„				„
„ „		„	5·6	„	„				„
„ „		„	1·3	„	„				„
„ „		„	1·2	„	„				„
„ „		„	6·7	„	„				„
„ „		„	7·4	„	„				„
„ „		„	1·5	„	„				„
„ „		„	5·6	„	„				„
„ „		„	1·4	„	„				„
„ „		„	6·0	„	„				„
„ „		„	1·5	„	„				„
„ „		„	7·4	„	„				„
Retouched „		„	1·4	„	„				„
„ „		„	5·6	„	„				„
„ „		„	0·9	„	„				„
„ „		„	5·1	„	„				„
„ „		„	3·0	„	„				„
„ „		„	6·5	„	„				„
Flake point (frag.)		„	2·9	„	„				„
Hacked blade		„	5·6	„	„				„
Fabricator edge		„	1·4	„	„				„
Diminutive axe		„	1·6	„	„				„
Rectangular „ ?		„	5·5	„	„				„
Retouched flake		„	1·6	„	„				„
Axe		„	3·3	„	„				„
Hammer stone		[1]Quartz	4·3	Buch. X	„ „				„
„ „		„	9·3	„	„ „				„
„ „		Greenstone	2·5	„	„ „				„
Grinder		Rhyolite or quartz porphyry	7·6	Baq. X	„ „				„
„		Rhyolite	5·0	„	„ „				„
„		Sandstone	8·9	1558	S.D. 63–64		XV 7		Ashmolean
„		Basalt	4·1	„	„ „		„ „		„
„		Dolerite	4·8	„	„ „		„ „		„
Hammer stone		Sandstone	7·0	„	„ „		„ „		„
Triangular slab		Talc-chlorite schist	6·2	„	„ „		„ „		„
Incised frag.		Limestone	8·7	„	„ „		„ „		„
2 Balls for game[2]			10·9	„	„ „		„ „		„
			8·6	„	„ „		„ „		„
			4·2	„	„ „		„ „		„
			7·7	„	„ „		„ „		„
			6·2	1536	„ 52–66	p. 37	„ „		„
			11·7	„	„ „		„ „		„
			7·8	„	„ „		„ „		„
			10·1	„	„ „		„ „		„
			8·9	„	„ „		„ „		„
			11·4	1457	„ 35–53	p. 37	„ „		Lost
			9·1	1500	Pre.		XIII 1	LI	Toronto
			7·9	1572	„		„ „	XLVI	Cairo 57566/9
			5·0				XIII 4		
			Axis cl				„ „		

[1] Dr. S. R. Nockold's identifications. [2] See register of miscellaneous objects p. 143 for the other pieces of the game.

CHAPTER IV

THE POTTERY

Predynastic.—Typology.

THE need for a revised Predynastic Pottery Corpus becomes increasingly apparent as further work is done upon this period. Before amplifying this statement, it is necessary to dispel the illusion which it raises in the minds of many people, viz.: that it implies a criticism or belittling of the original work. This is emphatically not so. The underlying idea represented by that work (which, of course, began long before the volume *Prehistoric Egypt Corpus* appeared) is only equalled in importance by the decipherment of hieroglyphs; it might almost be called "The Decipherment of Objects." So large is its implication that many archæologists do not yet seem to have grasped its significance. If Egyptology is to become an exact science, it can do so only by the fullest application of the basic idea of *corpora* introduced by Petrie into Egyptology. However long it be delayed by national and personal rivalries, the time must come when reproductions of *all* objects found in Egypt, no matter of what date or æsthetic worth, no matter who the finder, will be collected and arranged in type series in a set of uniform volumes, to which the excavator, research worker, or student can turn and find what he wants in as many seconds as it may now take him months. In view of the magnitude of the work started by Professor Petrie, there can be little wonder if constant revision and alteration has become necessary, and such revision no more belittles the original work than a new edition of a text belittles the work of Champollion. In reviewing *The Ballad of the White Horse*, Mr. Fowler Wright once said: "Many a lesser poet, like myself, who could never have written this poem at all, could have written it so much better." Fortunately, the products of scientific genius, unlike those of poetry, can be rewritten and improved, and it is the obvious duty and privilege of the lesser workers in this field to dress and build upon the foundations laid by genius.

To start a new corpus with the pottery from one cemetery, without including previously discovered material, would only add to confusion, and a new corpus must be left for The International Corpus of Egyptian Pottery to make. Some suggestions, resulting from a close study of Armant material, are offered here in the hope that they may prove of some value to those to whom the task eventually falls. Meanwhile, the new forms from Armant have been arranged and classified according to the existing method, which is the form of publication in which they will be most useful for reference till a new corpus appears, and from which it will be most convenient to convert them together with the previously published shapes.

It is not without careful consideration that we suggest a classification different from that proposed by Professors Droop and Peet in *Cemeteries of Abydos* II, pp. 10–13. The outline of the scheme put forward here was discussed with the latter, and, but for his untimely death, we should have had the benefit of his penetrating but sympathetic criticism. The plan formulated in *Cemeteries of Abydos* has been rejected because the classes there were too numerous, not readily identifiable, and not based upon sufficiently fundamental divisions.

The pottery of this period demands primary division by ware, according to which division there are four clear classes.

There is the ware made probably of Nile mud, sometimes with an addition of sand, but never chaff. It was often brought to a high finish either by simple burnishing or by the addition of a red ochre slip, afterwards burnished. It could not be fired to a high temperature, for if this were done it collapsed, and pots are occasionally found that have begun to vitrify. The pots are porous, sometimes brown in section, but more usually black, the black being sometimes due to insufficient or hurried firing. To this class belong Petrie's " Black-topped," " Polished-red " and " Fancy " (with a few exceptions),[1] " White-cross-line," " White incised " and " Black-polished " classes (W. M. Flinders Petrie, *Prehistoric Egypt Corpus*, London, 1921). It is difficult to find a suitable name for the new class, but *Nile-ware* is tentatively suggested, and the symbol N is used for it hereafter.[2]

The second class is *Desert-ware*, for which we have used the symbol D. This is made of a clay which can be fired to a high temperature thus making the pottery relatively durable. The clay was probably drawn from the Low Desert at a few localities only, and it is likely that specialised, wholesale production of pottery at one or two centres began with the introduction of this ware (see Dr. Cox's analysis on p. 186). This clay was sandy or sand was added to it. This class comprises the " Decorated," " Wavy-handled," most of the " Late," and a few " Polished-red " bowls. It is, perhaps, more truly " Stoneware " than any other in the history of ceramics, because it was a deliberate attempt to supplant stone vessels by pottery. The possibility of substituting the cheaper vessel for the dearer, and its equal usefulness, were emphasised by making the pots in the shapes of the stone vessels and imitating the colours of various rocks, just as the early linoleums imitated wood, marble and tiles.

The manœuvre was undoubtedly successful and there must have been much annoyance in the camps of the stone vessel manufacturers. It is interesting to speculate upon the possible riots between the two classes of workers, and the unemployment that must have been created in the stoneworking industry. Did the Wazir have monthly figures of unemployment in the industries ? And did they know all about " the time-lag in the re-absorption of employees into new industries "—presuming that there were Wazirs in the Protodynasties (0, −1, −2, etc.) ?

The third class was made of Nile mud with an admixture of chaff, often in quantity, was lightly fired, rough, and used for coarser vessels only. It was obviously a " cheap " ware, always made locally, probably often at home. Most of Petrie's " Rough " and a little of his " Late " belongs to this class, which we have called *Chaff-ware*, with the symbol C, since quantities of chaff were a necessary constituent to enable it to stand up to the firing.

The fourth class, comprising the remainder of the " Rough " and Brunton's " Town " pots, is similar to the last in appearance but fundamentally different in manufacture. Grit, shell, flint chips, or similar substances are added in place of the chaff. It has much more sand, was better fired, and is quite hard, but is, nevertheless, rather porous owing to its open texture.

[1] F20d, on Pl. XXIV is one of them, for it had chaff added, but it is an unusual vessel and the chaff was required to make the legs serviceable.

[2] The names given to classes of pottery by Petrie and Brunton and the abbreviations for them are here printed in inverted commas (*viz.*, " Black topped," " B " ; " Smooth Brown," " S.B.") except where an individual pot type is referred to such as B19g, SB6k. The new classes created here are printed in italics and the abbreviations in Roman without inverted commas (*viz. Desert-ware*, D).

This has been called *Grit-ware* (G). Examples of this ware are discussed in the technological reports on the sherds of the settlement (pp. 177–181).

Examining wares to see how they fall into these three divisions, we found that generally there was little difficulty in deciding immediately the class of any pot. *Nile-ware* is the most satisfactory, since it is only rarely that a specimen contains an unusual quantity of sand, or has apparently been fired to a higher temperature than is normal for the class. *Desert-ware* is less satisfactory, since many vessels, especially the " boat-pots," are often pinkish in colour, instead of the usual yellowish green, because they were fired at quite a low temperature, or were made from a less calcareous clay (see p. 186). The " Polished-Red " bowls belonging to this class are quite obviously different from those belonging to the *Nile-ware*, the body being light in colour and the coating crudely polished or left rough. Occasionally the body is burnished without being previously coated. The *Chaff-ware* and *Grit-ware* give no trouble.

The problem of secondary division of these classes is not an easy one. The first step seems to be to eliminate decoration, pure and simple, which can afterwards be classified separately. A glance at the *Pre. Corpus* will show the difficulties which have arisen in Petrie's " C " class, through uncertainty whether to classify by form or pattern.

The decorative patterns of pottery are relatively simple to classify, though some of the sub-types are difficult. The three main classes are : P painted, I incised, R relief. Each of these subdivides into h human, a animal, f floral, g geometric and m miscellaneous. The difficulty caused by a pattern which is partly painted and partly in relief is overcome by combining the symbols PR (also PI and IR). Similarly, a painted pattern of human-beings and animals would be Pha. By this method the first two sets of symbols are made self-explanatory. The sub-division of the patterns themselves is bound to be arbitrary. This system can be applied to pottery of any date from anywhere. For an illustration see the arrangement of the decoration of the Middle Kingdom pottery from Armant on p. 58 and Pl. XXXV.

To return to the classification of the pots, only two important considerations remain, " shape " and " finish." Under " finish " is included polish, coating and colour. Handles should perhaps be separated from the shape of a vessel, but these present no serious difficulty, as will be shown later.

It is not always easy to establish whether the *Nile-wares* have a coating or not (see p. 181 ff.) and it is therefore probably easier to divide them according to colour, *Black*, *Black and Red*, and *Red*.

No obvious subdivision of *Desert-ware* presents itself.

The *Chaff-ware* has not any peculiarities of finish sufficient to form a basis for subdivision.

Too little is known about the *Grit-ware* to subdivide it at present.

The criterion of form, or shape, is left to use as a basis for the types.

There must be one classification of form running throughout the whole series, that is, one set of types only. I do not think that it would even prove necessary to exceed ninety-nine types, which have always been kept as a convenient maximum. A careful re-survey of the material, unlikely to be very widely extended in the future, would certainly prove that a number of types could be amalgamated, since several of the present types are really sub-types of others. Moreover, since the same shape in different wares would have the same type number, a number of types would automatically be eliminated. There is no reason to change the arrangement by which the types begin with the " most open " and finish with the " most closed " though definition of these terms

is desirable. " Most open " may mean the highest ratio either of width of mouth to height or of width of mouth to base. Also the width of the pot at its widest part enters into the question. A pot with a mouth twice as wide as the base, and as wide as the pot is high, will look " more closed " if it swells out into a wide baggy body, than another with a " more open " ratio that has straight sides. The sub-types cannot always be classified on the same principle, but it seems advisable to do so whenever possible.

Capitals would serve as symbols for the classes ; N for *Nile-ware*, D for *Desert-ware*, C for *Chaff-ware*, and G for *Grit-ware*. For the sub-classes, further capital letters : B for *Black*, M for *Red and Black* (mixed), R for *Red*. Thus there would be NB, NM, NR, D, C, etc. But, since the same letters for sub-classes do not occur in the same class, it would be possible to drop the first letter, if desired, when using the symbols, as long as the names of the sub-classes are not used alone. It is quite permissible to use the symbol B for *Nile-ware*, *Black*, but not to describe a pot as of *Black* ware.[1] For the types, as in previous *corpora*, the Arabic numerals serve best 1, 2, 3, etc. to 99. For sub-types, " lower-case " Roman letters, a, b, c, etc. (giving 1a, 5c, 82f, etc.) if these sub-types are in the direct progression of subdivision of type. That is, if a type (say 9) be subdivided from the largest to the smallest, 9a must be larger than 9b, and 9m smaller than 9l. For sub-types not in this progression, the small letter should have a second similar letter added to it : aa, ab, etc. For example, if in the above hypothetical class 9, there were three pots similar to 9k in size, one of which had a wider base, one a narrower neck, and one a more everted rim, these would be 9ka, 9kb, and 9kc. These are all, of course, variations in shape, and only such variations come within the scope of this second letter.

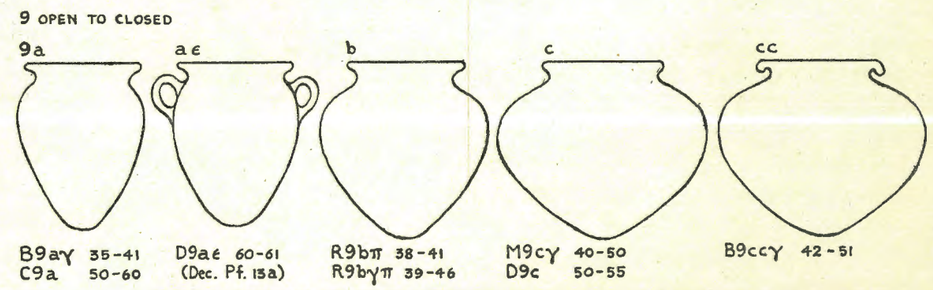
Now, since the usual pottery corpus is limited to line drawings, it is only necessary to make drawings of the types and sub-types, disregarding other considerations. The shape 6f, or 6fc, would remain the same *type*, whatever the class, sub-class or other detail, and the user of the corpus would look directly for the shape. Many of the types in the different classes and sub-classes would be different, but where they proved to be the same no difficulty should arise. Under each type would be written full details of the pot, so that the worker could see at once if the shape of pot had previously been found in the same class or sub-class, or at the same date, for if a shape occurred in *Nile-ware*, *Black* between sequence dates 35 and 42 and in *Desert-ware* between 62 and 66, this would be shown thus :

NB9b	or simply	B9b 35–42
D9b		D9b 62–66

To summarise the suggestions up to the present point : The number of symbols proposed is no larger than that in use for the old system, as witness B57a_2 in *Bad. Civ.*, yet each symbol gives more information than in the older system and the classification is placed upon a uniform, scientific basis. The capital letter tells the reader the ware of the pot (which F and L in the old system do not), the arabic numerals describe a shape which is the same for all Predynastic wares, and can therefore be memorised in many cases, or its approximate shape at least guessed at, while the first and second " lower-case " letters inform him what variation from the norm of the type the pot shows, and in what way.

[1] Strictly speaking, the classification should be : (1) *Desert-ware*, and (2) *Nile-ware* subdivided into *chaff*, *grit*, and *plain*, the *plain* being further sub-divided into *Black*, *Red*, etc., but this is unnecessary pedantry and adds nothing.

To complete the scheme, a further set of symbols is necessary but these would be few, uniform, easily memorised, and would also give useful information about the pot. These are the symbols to describe the details so far ignored : coating, polish and handles. The last named would have to be drawn, and this is the one case where the same shape would need to be drawn twice, but it would not need a new type number. It is suggested that the letters of the Greek alphabet should be adopted to denote the presence of these features ; say γ for a coating, π for polish and ϵ for handles. So a drawing of a pot with handles would carry the same type number but with ϵ added at the end. To take the example already cited, B9b or D9b would be the same shape as B9bϵ, but without handles. To illustrate the scheme, a hypothetical section of the proposed corpus is added below.



The symbols for the different decorations found with a shape, would be added to the description of the pot, so as to refer the reader to the corpus of decoration. Similarly, in the latter, against the decorations would be placed the symbolical description of the pots on which they occurred.

For short descriptions of colours the conventions used in *The Bucheum* (Fig. I, p. 190), the first and last letters of each colour, are adequate. Where more careful description of colour is needed the Ostwald system is the best (see p. 187).

Though the dotted section line was unanimously adopted at the first meeting of the I.C.E.P. as the best way of showing the thickness of a pot, the method of showing half the pot in section, with the thickness in solid black, is still so popular that it is perhaps worth recapitulating the arguments against this method : (1) It focuses attention upon, and heavily underlines, the least important feature of the pot. There are no Egyptian wares, and only two or three elsewhere in the world, which are differentiated by their thickness. (2) It detracts from the clarity of the general shape of the pot and makes recognition slower. (3) Being so definite, it gives an impression of accuracy which is usually misleading, since the measurement is not only difficult, but frequently impossible to take more than a short distance below the rim, especially in small vases with narrow necks. There are many pots drawn thus which could only have been measured if they were cut in half. True, a number of drawn pots are reconstructed from fragments, but is it to be believed that those excavators who use this convention always find incomplete pots ? Or do they saw them in half ? Or—tell it not in Gath, publish it not in the streets of Askelon—do they guess this thickness which is printed so heavily in black ? The dotted line is equally informing, less dogmatic, less distracting to the eye, and need be carried only that distance down the pot which can be measured.

After the above classification had been made, Mr. A. Lucas drew my attention to Dr.

Reisner's remarks on the composition of wares in *Kerma*. Reisner did not attempt any fundamental classification of the pottery based on the different compositions, but he clearly noted these, and his views are closely similar to those expressed here and supported by Dr. Cox's analysis on p. 186.

Kerma, IV–V (" Harvard African Studies " Vol. VI), 1923, p. 321. Speaking of to-day :

" In most of the small local potteries in Egypt of which I have personal knowledge, the black Nile mud is seldom if ever used. But in Nubia the chief ingredient used in the dough is river mud, while only a small proportion of some material found in the desert is added to obtain coherence. The Nubian potteries are small local affairs, and the potters, as far as I have seen, do not use the wheel."

Describing the *Keneh-ware* : " Greenish or yellowish-drab ware : wheel made. The material of the Keneh pottery is a natural mixture of *tufl* clay and desert detritus accidentally produced by rain torrents. . . ." He remarks that this mixture occurs only at this one place, but that the ware is imitated elsewhere.

Speaking of the past, p. 323, he says : " Nubia is the land in which the basis of material was Nile mud, and Egypt that in which desert deposits were largely used. . . . A mud mixture was that employed in the Early Predynastic period, and the first great step in the development of Egyptian pottery was the introduction of a reddish-drab ware with a basis largely of desert mineral (or clay) which marks the beginning of the Middle Predynastic period." He adds that the new ware was sometimes coated to resemble the old and he is no doubt referring to the *Desert-ware* bowls with a red ochre coating which fall into the " Polished Red " class. On p. 449 he equates his " smooth-coarse " with Petrie's " rough-face." He says " the clay was mainly Nile mud mixed with *tibn* " (chaff).

Description of the Plates.

There is little exceptional in the " Black-topped " ware (Pl. XXII). Attention may be drawn to the E.P.III (Badarian) bowl BB 19 k, which was found near, but not attached to burial 1209. The potmark (owners) on B 21 e_1 is unusual. The faint lateral rippling on B 57 a may have been caused by uneven shrinking between the coating and the body during firing. B 44 b (1598 d) and B 58 b (1461 b) both showed much wear at the base from being repeatedly stood in hard ground. B 57 a_2 (1416 b) had a rough criss-cross of burnishing at the base which was otherwise unpolished.

The two bowls with designs painted in red on the outside, P 23 a_1 and P 23 c_1 (Pl. XXIV), though polished inside, belong to the new *Desert-ware* category, and are of the same family as D 78 b_1, with a crocodile in red on the outside (Pl. XXV). F 80 t and N 68 a are both rare types, especially the former.

There is a great variety of technique among the bowls all at present classed in " Polished Red." There are *Nile-ware* bowls with a red coating burnished all over, and the same wares with a coating, but unburnished. There are (occasionally) examples of *Chaff-ware* treated in both these ways, and there are *Desert-ware* bowls with a coating inside and just round the outside of the rim, sometimes burnished and sometimes not. When these are burnished the burnishing is seldom all over and the marks of the burnishing tool are clearly visible. Sometimes this effect is obviously merely careless, but occasionally it is done to create a pattern. Finally, there are *Desert-ware* bowls of a red clay which have been burnished without the addition of any coating. Pl. XXII, Fig. 2, the right-hand bowl of the top row, is of the last-described kind. To the left of

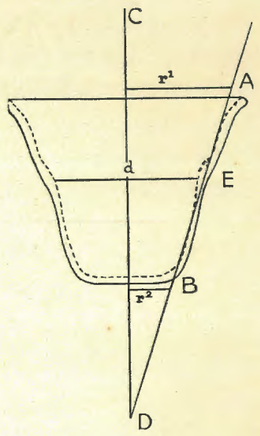
it is a bowl burnished all over in black and below it one burnished all over in red. In the centre of the middle row is one with spaced burnishing neatly done. The right-hand bowl of the bottom row shows the coating extending over the edge of the bowl. All these bowls and several others, including all the varieties mentioned above, are in the Ashmolean Museum, where it is hoped that further study upon them will be undertaken. Miss Billington has suggested that some of these bowls were pressed into a mould and that the coating was, in fact, taken down to the beginning of the mould.

Among the " Decorated " pots (Pl. XXV) D 22 a and D 23 c are the most unusual. D 43 b_1, again of the *Desert-ware* category, is undecorated, but has been put in the D class because there is nowhere else for it to go in the present classification.

On Pl. XXVI, miscellaneous drawings No. 1, is a strange object, of which, being fragmentary, it is impossible to guess the purpose. Drawing No. 2 is of a curious lump of lightly baked clay, carrying the impression of the human hand. That this object was not accidentally made is clear, because one was found in Settlement 1,000, see p. 176 and three in grave 1542. A photograph of one of the latter objects appears on Pl. LVI, Fig. 4, and of the former on Pl. LVI, Fig. 1, where there is also shown an unidentified object in B ware from grave 1485.

The " White cross-line."

The *Nile-ware* with a polished red slip decorated with designs in white (" White cross-line ") is illustrated on Pls. XXVII and XXVIII. For a long time we thought that this was a new type of pattern for this kind of ware and it was not till looking very closely at the designs in the corpus (for another purpose) that we noticed type 47. This convinced us that the method of drawing the design in perspective was inadequate. The patterns have therefore been projected on to the paper to scale, and reproduced at 1·3 instead of 1·6, since so much trouble had been taken to render the reproductions metrically correct that it seemed a pity to reduce them to a scale at which the measurements would be useless. The method of projection used has been to treat the painted surface of the pot as a cone and to make such adjustments as are necessary to allow for its variation from this form. The method used can best be understood from the diagram. A line was drawn, representing as nearly as possible the angle of the side of the pot, A and B being marked off, giving the additional extra length to allow for the everted lip of the pot and the curve in the side and into the base. CD is the axis of the pot, meeting AB at D. Then DB is the radius of the inner arc of the projection and DA of the outer. Two perpendiculars are dropped from A and B on CD



giving lengths r^1 and r^2 ; then to obtain the angular extent of the diagram in degrees, divide r^1 by DA (or r^2 by DB) and multiply by 360. In some examples where the side of the section of a pot varied much from a straight line, it was necessary to correct for the curves of the side. This can be done by the same method or by measuring the diameter (d) of the pot at the required place (E). The angular extent on the diagram of the pot at this point can then be found by the formula : angle in degrees equals $d \div 2DE \times 360$. In type C, 37 b the pattern has not been made to follow the true line of the pot as this would give a misguiding impression.

In 47L the pattern curves over on to the interior of the pot and the interior pattern has been projected on to the top of the exterior pattern to simplify the projection, though the curve is thus made to run the wrong way.

The distance between the bottom of the pattern and the lowest arc represents the distance between the bottom of the pattern and the centre of the pot.

We have not drawn the pattern of these pots white on black as is customary, for there does not seem to be any particular advantage in this. For the " Black-topped," " White-incised," and " Polished black " (where it is not done), there seems to be reason, but not with the " White cross-line." In all periods white is a colour frequently used in decoration, but the pot is not shown as black for that reason.

A study of the painting of the patterns produced some interesting considerations. Anyone who tries will find that in drawing a wavy line with a paint brush the upwards strokes are thicker and deposit more paint. In 47L it was found that some of the lines near the rim had run upwards, showing that they had been painted with the pot held upside down. The thicker lines ran upwards from left to right. From these two facts it is clear that the painting was done from left to right. The join of the line helped to confirm this. In the insides of the pots it is noticeable that the circumscribed wavy lines meet the radial lines on one side of the segment and not on the other. Experiment shows that where the lines do not meet must have been the finish of the stroke, since the terminus of the line is hidden behind the brush. Knowing that the lines were drawn from left to right, we then see that in C 47 a the pot was held with its mouth slightly downwards and the decoration was painted with the hand resting on the same side of the pot, whereas in C 47 c it was done with the mouth held upwards and the brush working across the pot from the opposite side of the rim—an awkward method.

A comparison of the ratios between the main dimensions of these pots is interesting, for they bear simple relationships to each other. In the following table each measurement is the mean of three or more determinations, taken to the nearest half-millimetre. For C 47 b the figures are taken from a scale drawing at half size. The mean difference is the arithmetical mean of the differences between the hypothetical and actual ratios of 1:2, 1:3 and 2:3. It is only an approximate figure.

Type.	*Width of mouth.* 1	*Height.* 2	*Width of base.* 3	*Ratio.*	*Mean difference.*
C 37 b	14·6 cm.	5·85 cm.	—	15 : 6	0·01 cm.
C 47 a	15·95	6·95	6·3 cm.	16 : 7 : 6	0·25
C 47 b	18·0	7·85	6·3	18 : 8 : 6	0·25
C 47 c	16·95	8·4	6·3	16 : 8 : 6	0·10
C 47 l	15·5	10·2	6·3	15 : 10 : 6	0·15

It will be seen that the approximation is very close. It is worth noting that C 47 b_1 when tested on the drawing did not produce any such ratio, which, though it is not a strong recommendation for the theoretical dimensions arrived at in the reconstruction, proves that the other ratios are not accidental. It is hardly conceivable that there was a theory of æsthetics at the date when these pots were made, and the philosopher is left with the conclusion that it is the earliest desire of man when he makes things to make them in simple proportions. This is the more curious, because the largest things in nature, trees, mountains and hills, do not follow this rule, even in Egypt where Nature is more geometric than elsewhere. The human body is in simple

proportions, so perhaps anthropomorphism, and the reproductive instinct are the basis of all art. At least, all good art appears to be imitative of nature in this most fundamental aspect.

It is hardly credible that the pots were made to measure—both the method of manufacture and common sense deny it—yet the identity of the bases in size cannot be overlooked. Regarding the ratios as correct and omitting C 37 b, which is widely different from the others, the measurements yield a unit of 1·02 ± ·01 cm., using the method given in *Inductive Metrology*, pp. 28–29. This might be two small *khet* which make 1/50th the Royal cubit (1·05) or 1/7th the True palm (1·06). The above figure is a mean weighted strictly according to the squares of the lengths, but the greater resemblance between the base measurements than the others should perhaps give them greater weight. It is even possible that they were measured and the other measurements arose in proportion from them as a matter of eye. If this were so the unit would be 1·05 ± ·00. It is safer, however, to consider that the pots are ametric, and the uniformity arises from the method of manufacture. The potter perhaps started each pot by pressing out the clay in the base of a broken pot. Differences in firing and smoothing would account for absolute uniformity not remaining.

Not less interesting than the proportions of the pots, is the close approximation of the circumference of the mouth to a circle. The largest deviation from a true circle is one of 3 mm. in C 47 1 ; otherwise, there is nothing greater than 2 mm. The coincidence in C 47 a is truly remarkable, 193 degrees of the perimeter not being perceptibly in error at all. It must be remembered that some alteration in shape would almost certainly take place in firing. The correspondences can best be appreciated by reference to the diagrams on p. 69. Do these resemblances indicate that these pots were made, or finished rather, on a slow wheel (see p. 177) ?

A few decorated sherds and potmarks from the cemetery area are figured in the plates of Settlement pottery and are discussed at the end of the pottery chapter of that section on p. 176.

Dating. In the register of pottery found on p. 64 ff there is a column for dates. Those dates in Roman type are the dates taken from the *Pre. Corpus*, while those in italics are given by ourselves. It will be seen that dates are given, not only to new forms found by ourselves, but also to undated forms in Petrie's corpus and to forms in *Badarian Civilisation*. These dates are added, as it was felt that perhaps the most useful part of additions to the corpus consisted in the dates of pots, but in order to make them valuable it was necessary to indicate their reliability. This has been done by adding above each date, at the top right-hand corner, a small figure indicating the number of graves which supplied evidence for the date of a pot, thus 38–47[1], but this in itself is not sufficient, since a grave with twelve dated pots is more valuable as evidence than a grave with one. Similarly a grave in which there are four pots: 35–38, 32–40, 45–50, and 47–55 (giving a date 38–47) is less valuable than one having four pots dated 35–50, 38–55, 40–47, and 36–48 (giving the same date). The more doubtful dates have, therefore, a query after them, thus 38–47[1?]. It will sometimes be found that there are two pots occurring in the same tomb, one of which has a date with a query and one without. This is when the first pot was found loose in the tomb and the second *in situ*. By this method, anyone wishing to use these dates can see at a glance their reliability, and can ignore the more insecurely dated when there is other evidence to be obtained. It is to be hoped that in these cases excavators will add their evidence to strengthen the dates of such pots. Although not found in many tombs, the dates of R26c and 66p, are well secured.

Dates from Armant have been given to new types from *Bad. Civ.* since dating in that volume

is based not only on the pots but also on other criteria. Two changes have been made in pots already dated by Petrie, R21b and P23d, to which additional dates are added in italics, bridging the hiatus which is known to occur with certain pots in the *Pre. Corpus*. The reasons for this are given, since to alter *Pre. Corpus* dates might appear to be working in a vicious circle. These two pots occurred in 1583 with the following (previously) undated types : R26f, L19p, L30k (4), L36s, and L40b (2). The other occurrences of the latter pots are as follows :

				Dates.
R26f in 1590 dated	76–77			76–77
L19p „ „	„ „			76–77
40b „ „	„ „	and in 1592 dated	73–79	76–77
30k „ 1344	„ 77			77
36s „ 1557	„ 63–77	and in 1592 dated	73–79	77–79

This evidence appeared sufficiently strong to justify the addition. It may be mentioned that L30m, dated 58–66, is the only pot of its type not dating to the 70's and probably extends to that period. No change has been made here, as it would be working in a circle to do so.

Protodynastic.

To the Protodynastic pottery from the tombs published in this volume are added the pots of this date from cemeteries 200–900, published in *J.E.A.*, XVII, November, 1931. All the pottery was there published in group form, and the dynastic pottery was not typed. The Græco-Roman ware has already been republished in corpus form in *The Bucheum*, and now that the dynastic wares have been included in this volume the whole of the ceramic material has been made more readily available than was formerly the case. A very few new types of Predynastic ware from the same dig will be found in that section of the corpus. New dates have not been given in the register to Protodynastic wares since they come from so few tombs. A glance at the Proto. Tomb Register will show the dates if required. A few details of typed wares have been added.

Middle Kingdom.

The Middle Kingdom pottery has been separated from its patterns and the two classified separately in the manner described above (p. 000). The convenience of this is apparent. The pots, 10M and 10Q, have retained a simple exterior decoration in the pottery type series. It was not worth transferring this since the pots were not brought home and we had not the detail to complete the circuit.

The corpus has been arranged so as to fit in with Brunton's corpus of the Ninth to Eleventh Dynasties in *Qau and Badari II*, Pls. LXXXIX–XCII, that is, where the same types occur in the Middle Kingdom tombs as in Dynasties Nine to Eleven, the same types are used, and the pots fitted into the sub-types. New types are inserted in place of those that have disappeared. This was done in preference to making use of, and referring to, the large number of volumes in which Middle Kingdom pottery has been published, *Harageh*, *Gizeh and Rifeh*, *Qurneh*, *Gurob*, etc., more especially as reference has already been made to *Qau and Badari II* for the beads. The need for an International corpus is especially apparent when research has to be made into the materials from periods which have been dug by many people in different places at different times.

With only one and a half tombs dug, it is too soon to make elaborate comparisons with a

view to dating, but Baly did some work on the subject, and Professor Garstang kindly lent him his unpublished field notes of his dig at Rizeikat. He has supplied the following notes : " *Pottery Decoration.* This appears to be very late XIIth, passing through Second Intermediate to the New Kingdom. The white spotting is particularly noteworthy in this regard as it is certainly late. (See Peet *The Cemeteries of Abydos II*, Pl. XIII, ps. 1 and 2 and ps. 65/66. The parallel ' finger-marking ' in *Qau and Badari II* is only apparently contradictory, as it seems to be confined to the ' Drop vases,' and we found only one fragment (in 1213, undrawn) of that type so decorated. *The Pottery Types.* These are rather contradictory, some leaning to the XIth Dynasty and some definitely XIIth running into the Second Intermediate period. As a whole the tendency of the types, like the decoration, is to show a late Middle Kingdom date for the tombs." See also the notes on the tombs themselves on pp. 22–24. Tombs 1213 and 1214 being both family vaults, it is probably best to hold an open mind about the date of the pottery, which might extend from the Eleventh to the Thirteenth Dynasties.

The Funerary Cones. These had never carried inscriptions. Baly writes about these : " Funerary cones are, of course, characteristic of the XVIIIth Dynasty. It is interesting that Rizeikat is the only place outside Qurneh where Daressy has noticed them, and the only place where they occur before the XVIIIth." They were of *Chaff-ware*, lightly and quickly fired. Two are illustrated at the top of Fig. 6 on Pl. XXII.

Pottery Offering Trays. The best examples of these are shown in Figs. 5 and 6 of Pl. XXII. There is no very close comparison with these among the *Gizeh and Rifeh* specimens (Pl. XIV of that work), but the latter are all Early First Intermediate. On p. 16, Petrie says : " We never find here the two parallel water channels, which often occur at Dendereh, and on those in the Cairo Museum from near Erment ; that seems to be a more southern type." We have not been able to trace any publication of the examples in the Cairo Museum, nor have we seen them. No. 11 in the Armant series is perhaps comparable with No. 7 of the Dendereh series (*Dendereh*, Pl. XIX) and No. 12 to Dendereh 5. Of these Petrie says (p. 26) : " The rude trays of offerings of pottery, Pl. XIX, have not been precisely dated before. Most of these were found in indistinguishable pit tombs without any sculpture. Some few are, however, dated. The earliest is 15, of Class D, or about the IXth–Xth Dynasty. The next is No. 3, that of Mera, which is of Class E, or the earliest XIth Dynasty. The next is No. 13, which is of Hotepa, Class F, or middle XIth Dynasty. It seems, therefore, that they began as simple tanks just before the XIth Dynasty, and the models of food were added later. The complex forms with shelters, staircases, and upper storeys belong to the XIIth Dynasty." The last-named are, of course, the " Soul houses," examples of which are carefully described in *Gizeh and Rifeh*. Unfortunately the class numbers, D, E, etc., are not inserted on Pl. XIX so we cannot date Nos. 5 and 7 precisely, but from his commentary the examples with which we can make comparison would seem to be late Eleventh Dynasty. The fact that the water channels are more decadent in the Armant specimens, and the food offerings more elaborate, seems to show that they are later than the Dendereh specimens. It is, perhaps, possible that here they continued into the Twelfth Dynasty in place of the Soul houses, but the general conclusion from them appears to place 1214, at least, in the Eleventh Dynasty. The most interesting features of the tables are the complete oxen, trussed in 1–9 and 11, and free in 13, and the miniature pottery cones in 11. These are probably miniature copies of the loaves which the large cones presumably imitate. There are also some shorter, more abrupt cones, both on 11 and 10. Notice the double water channel, which Petrie gives as a southern

feature, in 4 and 12, and the triple channel in 11. A comparison between these trays and Græco-Roman offering tables is made in *The Bucheum*, I, p. 77.

Contents of Pots.

From the following table showing the contents of the pots it is clear that the use of mud is confined to a fairly narrow period, apparently from about S.D. 60–75, though further statistics might extend this. Vegetable remains occur only three times in the earlier periods and thirteen times between 59 and 68. There are not enough examples of the other materials to draw any conclusions from them, but in view of the date of the use of mud, it is worth noting that ashes occur in seven from 67 to 73 and in one at 48–53 ; dregs from 65 to 75 and " Brown powder," possibly also dregs from 63 to 73.

Mud occurs mostly in " Wavy-handled " and " Late " jars, occasionally also in " Rough " jars. These are the same types in which dregs were found. It is difficult to see what mud might be meant to represent, but muddy water might easily represent beer—in fact, it is sometimes alleged even to-day.... But it seems that the mud was put in in a viscous state. Ashes might be put in underneath a bun to represent more food, simply because it was an easy substance with which to fill the jar, but sand would have done equally well, and it is probable that some other explanation must be looked for.

TABLE OF CONTENTS OF POTS

Contents	Notes	Composition	Pot	Tomb	Date
Ashes			R66m	1520b	—
,,			81	1525h	44–67
,,			81	1523b	48–53
,,	with bun on top		84e	1498f	38–67
,,	,, ,, ,, ,,		L30g (3)	1591a-c	68–78
,,			h (2)	1590b, d	76–77
Basketwork	as lid		R81	1499d	38–66
Bread			P24l	1566b	42–59
,,		Grains, Emmer-wheat and Barley (?)	R81	,, g	,,
,,	on mud		,, (2)	,, a, f	,,
Bun	on ashes		L30g (3)	1591a-c	68–78
,,	,, ,,	Largely grain, Emmer-wheat (?)	h	1590b	76–77
,,	,, ,,		,,	,, d	,,
Charcoal			B62a	1448e	45–57
,,	with grain	Acacia (?)	W43g	1514e	47–65
Dregs	(from beer ?)		R81	1517b	41–67
,,	,,		84e	1519g	73–79
,,	,,		L30g	1591e	68–78
,,	,,		,, (3)	1518c, e, i	75–77
,,	,,		h (3)	1593a-c	76–77
Dung	Goat		R81f	1519c	73–79
,,	Mouse		L30g	1518k	75–77
Fabric			R11	1448c	45–57
Malachite			R22a	1464d	55–65
Mud			P40g1	1512b	60–73
,,			W19	1541m	58–62
,,			24	1565f	42–66
,,			,,	1568e	42–77
,,			,,	1580k	53–70

TABLE OF CONTENTS OF POTS—*Continued*

Contents	Notes	Composition	Pot	Tomb	Date
Mud			27	1541l	58–62
,,			41	1558a	63–64
,,			43b	1522c	57–66
,,			,, (2)	1468b,d	,,
,,			47m	1512f	60–73
,,			R81f	1519d	73–77
,,			84s	1592b	73–79
,,			L30g (2)	1518b, d	75–77
,,			p	1592a	73–79
,,			36s	,, d	,,
,,			40b	,, e	,,
,,			,,	1590f	76–77
,,	with bread on top		R81 (2)	1566a. f.	42–59
,,			,,	,, d	,,
,,			D63	,, c	,,
Powder Brown		Vegetable	P46a	1590i	76–77
,, ,,		,,	D10g1	1408d	50–63
,, ,,		,,	W56g	1590h	76–77
,, ,,		,,	R84e	1519f	73–79
Vegetable remains		Stem and leaf, Emmer-wheat(?)	BB19k	1209B	E.P. III
,, ,,		Grains, Emmer-wheat (?)	B11f	1473a	46
,, ,,		,, ,, ,, ,,	38c1	1514e	47–65
,, ,,		,, ,, ,, ,,	P24l	1591f	68–78
,, ,,		,, ,, ,, ,,	n	1486b	38?
,, ,,		Stem and leaf of grass	40h	1566k	42–59
,, ,,	with mud		D63	,, c	,,
,, ,,		Grains, Emmer-wheat (?)	W43b	1577g	57–64
,, ,,	with charcoal	,, ,, ,, ,,	g	1514f	47–65
,, ,,		,, ,, ,, ,,	R81	1532b	57–61
,, ,,			,,	1535e	44–61
,, ,,			84d	1512e	60–73
,, ,,			e	1541c	58–62
,, ,,		Grains, Emmer-wheat (?)	?	1442?	57–61
,, ,,		,, ,, ,, ,,	Basket	1471	38
,, ,,		,, ,, ,, ,,	,,	1566	42–59
Wood			B74a	1406a	33–57
,,			b	,, b	,,
,,			8M	1314	VI
Beads			Breccia Vase	1357J	44–64
Resin (?)			Gypsum Vase	1466	38–48

DISTRIBUTION OF POTS AND SHERDS NOT BURIED

E.P. II (Tasian)

" Beaker " Ware

Type	*Fundplatz*	*Distribution*
Sherd	Baq. R.	Q.
,,	Ar. X	A.

E.P. III (Badarian)

" Black Topped " Ware

Type	*Fundplatz*	*Distbn.*
19k	1209B	T.
Sherd	Buch. X	Q.
,,	,, ,,	A.
,,	1300	T.
,,	,,	Cairo 57545
,,	,,	Cairo 57546

" Polished Red " Ware

Type	*Fundplatz*	*Distbn.*
Sherd	Buch. X	Q.
,,	Ar. X	A.

" Smooth Brown " Ware

Type	*Fundplatz*	*Distbn.*
15c	1209A	T.
Sherd	Ar. X	A.

" Rough Brown " Ware

Type	*Fundplatz*	*Distbn.*
Sherd	1300	Q.
,,	,,	A.

PREDYNASTIC.

"Black Topped" Ware.

Type			Type			Type			Type		
11m	1470b	A.	39b1	1541s	W.	57b1	1471a	A.	71b	1453	Held.
25f2	1466d	,,	44b	1598d	T.	57b1	1400	C.S.	72a	1488a	T.
25g	1466c	,,	47	1400	Q.	57g1	1400	T.	74a	1458c	A.
33p	1400	T.	57a	1501	T.	58b	1461b	,,	74b	1433a	W.
35b	1489a	,,	57a1	1458f	W.	61a	1445	,,	76g	1474	T.
37b	1468e	,,	57a2	1416b	Q.	62a	1448e	,,	80e	1419	A.
37b1	1520c	,,	57b1	1470a	T.	62b	1566e	,,	94c	1458d	,,
									97v	1500	Q.

"Polished Red" Ware

Type			Type			Type			Type		
7	1427b	T.	24m	1441e	C S.	24n	1400	Q.	41c	1500	W.
16	1526a	,,	24m	1530i	T.	24n	1500	W.	45b2	1534e	T.
23	1356	A.	24m	1550c	W.	24q	1558g	A.	47a	1418	,,
23c	1514b	T.	24n	1466g	A.	28a2	1400	C.S.	75g	1400	Q.
24c	1476b	A.	24n	1486b	T.	40a	1347	W.	75g1	1539f	A.
24k1	1458c	,,	24n	1487a	,,	40d1	1558f	A.	82l	1570g	T.
24l	1566b	,,	24n	1577e	Q.	40e1	1570a	T.	93	1565g	A.
						40h	1566k	A.	95b	1468f	T.

"Fancy" Ware

Type	*Fundplatz*	*Distbn.*
14	1457	Q.

"White Cross-lined" Ware

Type	*Fundplatz*	*Distbn.*
44b (shd.)	1457	Q.
47a (shd.)	1202	Cairo 57693
37b, 47b, 47c, 47l all in possession (Bought)		O.H.M.

"Black Incised" Ware

Type	*Fundplatz*	*Distbn.*
68a	1425	Cairo 57700

"Wavy Handled" Ware

Type	*Fundplatz*	*Distbn.*
43g3	1500	Q.

"Decorated" Ware.

Type			Type			Type			Type		
1u	1598g	T.	22a	1579a	A.	57d	1477	W.	67d	1496o	Cairo 57695
8b(shd.)	1581	,,	23c	1469b	T.	62a	1430b	Q.			
10g1	1408d	A.	32l	1363	Q.	63	1566c	W.	67r	1496d	Cairo 57696
20p	1590c	,,	36a1	1566n	A.	63d	1541t	T.			
20q	1578c	Cairo 57698	53a1	1575h	Cairo 57697	67b	1500	Cairo 57699			

"Rough" Ware

41c	1496n	Q.
Sherd	1300	C.S.

"Late" Ware

7b	1566m	A.	19p	1583k	A.	20	1573e	A.
16b	1595c	A.	19p.	15900	,,			

PROTODYNASTIC.

14m 1312 A.

DYNASTIC.

4S1	1310Nb	A	4S1	1310Wb	Cairo 57706	90S1	1310Wa	Cairo 57707
90S1	1310Na	,,						

In addition to the pots in the list noted as being at Cairo, there were retained there a number of pots from various graves in cemeteries 1400–1500, details of the types and graves of which were not retained by us.

5	"Polished Red" Bowls	Cairo	57688/92
2	,, ,, ,,	,,	57704/5
1	,, ,, Pot	,,	57687
1	,, ,, ,,	,,	57703 (Unburnished)
2	"Wavy handled" jars	,,	57701/2
14	"Black-topped" pots	,,	57673/86
1	Sherd of "Decorated" ware	,,	57694

POTTERY OFFERING TABLES OF THE MIDDLE KINGDOM

Object	*Size* L.	W.	Th.	*Fundplatz*	*Illustrations*			*Distribution*	*Notes*
Table	30	25½	5	1214	XXII	5	1	Toronto	*Chaffware.* Very lightly fired, friable and porous. Pink. coating
,,	34	28½	4½	,,	,,	,,	2	,,	
,,	31½	27	5	,,	,,	,,	3	W.H.M.M.	
,,	28	20+	5	,,	,,	,,	4	Toronto	
,,	27½	21	4½	,,	,,	,,	5	W.H.M.M.	
Cone	45 Diam. 7½–3½			,,	,,	6	1	Toronto	Same without coating
,,	48 ,, 7–3½			,,	,,	,,	2	Cairo 57544	
Table	35½	28½	4	1213	,,	,,	3	Toronto	
,,	28½	24½	3½	,,	,,	,,	4	W.H.M.M.	
,,	26½	25	4½	1214	,,	,,	5	,,	As tables above.
,,	24½	25½	3½	,,	,,	,,	6	Cairo 57541	
,,	26½	27½	4	,,	,,	,,	7	,, 57542	
,,	29+	21	5½	,,	,,	,,	8	Cairo 57543	
,, (frag.)	25+	24	5	,,	,,	,,	9	Toronto	Better fired. Orange surface, possibly coating.
,, ,,	21+	22+	5½	1213	,,	,,	10	,,	
Frags. of 13 tables	Various			,,				W.H.M.M.	Of the above wares.

ADDITIONAL NOTE.

Three interesting facts were noted as a result of using some Predynastic "Black-topped" jars to contain water.

The water which seeped through the pots into the saucers, on which they stood, was yellow in colour, and, when a saucer was allowed to stand and dry, a heavy deposit of salts crystallised out.

It was evident that the action of the water passing through the pottery was removing the impurities much faster than if the pots had been allowed to stand in water. This discovery was applied practically by standing a weighted pot, empty of water, in a bowl filled with water to the brim of the pot. The water was thus forced by gravity through the pot from the outside inwards, so that any salts not removed would have been liable on drying to crystallise out on the inner surface. It was found that, after three soakings, thorough drying did not produce any salts on the surfaces. This is the quickest and best method we have yet discovered of clearing a pot of its salts. It might be possible to treat similarly a stela of sufficiently porous stone by making a waterproof tank on the face and letting fresh water continually seep through the stone and out at the back.

One pot had been lightly greased on the surface two years before its use. Very little water came through this, although it was kept full for several days. It seems quite possible that these pots were greased anciently, since this would have made them non-porous for all practical domestic purposes, and accident could hardly have failed to provide the clue to this fact. My wife tells me that the Masai grease their pots for this purpose to-day.

Mr. C. R. Bailey, who kindly examined the salts from the pots, reports on them as follows:

"I had not sufficient time to make a complete analysis and the proportions are only very approximate. The percentages of various substances are about: 80 per cent sodium chloride, 10 per cent calcium chloride, 5 per cent carbonates and sulphates of sodium and calcium, and 5 per cent of iron hydroxide. Traces of aluminium, magnesium, silica and potassium were also found. Some organic matter was present. This blackened on heating, and partly reduced alkaline permanganate to manganate, that is from purple to green, but the reduction proceeded no further. This might indicate a citrate, amongst many substances."

O. H. M.

REGISTER OF POTTERY FOUND.

(For E.P. II (Tasian) & E.P. III (Badarian) See distribution list.)

PREDYNASTIC.

"Black-Topped" Ware

Type	Illustrations[1]	Fundplatz	No. of tombs in which pot occurred	Total No. of pots found	Dates
1b	P.	1402	1	1	35–50
11f	„	1473	1	1	31–63
„ m	„	1470	1	1	38
14g	△	1466	1	1	*38–48*[1]
18f	„	1582	1	1	———
19a	P.	1417(A)	1	1	30–47
„ c	„	1544(2)	1	2	*44–46*[1]
f	„	1414	1	1	———
21b	„	1420	1	1	30–47, 62
d	„	1544	1	1	35–46
e1	△	1400 1500	2	2	———
25a	P.	1400	1	1	31–55
d_3	B.	1466(2)	1	2	*38–48*[1]
f	P.	1577	1	1	30–50
f_2	B	1466	1	1	*38–48*[1]
g	P.	1466	1	1	31–56
l	„	1400 1429	2	2	*38–48*[1]
27a	„	1466	1	1	32–48
c	„	1431	1	1	33–45, 62
29b	„	1432	1	1	34, 41, 58
c	„	1534(2)	1	2	*63–66*[1]
35a	„	1413 1455	2	2	32–43
b	„	1489	1	1	38–46
c	„	1415 1416 1500	3	3	36–51, 70
d	„	1514 1575	2	2	34–43
g	„	1347	1	1	*64–65*[1]
37b	„	1468	1	1	63?
38a	„	1541	1	1	43–66
c_1	△	1514	1	1	*47–65*[1]
39b	P.	1355 1541	2	2	39, 63
b_1	△	1541	1	1	*58–62*[1]
41e	„	1599	1	1	*38–67*[1]?
42a	P.	1370 1440(2) 1441	3	4	37, 57, 70
b	„	1532	1	1	31–50, 63
k	„	1492	1	1	38
44b	„	1598	1	1	40–48
x	△	1468	1	1	*57–66*[1]?
46	P.	1596	1	1	41–51
50	„	1539	1	1	48–66
53a	„	1347 1466 1499(A) 1511 1521 1553 1565 1566	8	8	38–66
b	„	1328 1566	2	2	33–75
c	P.	1464 1500 1561	3	3	55–70
c1	△	1500	1	1	———
53d	△	1514	1	1	*47–65*[1]
f	P.	1520	1	1	———
54a	„	1596	1	1	33–64
55b	„	1411 1412 1472 1487	4	4	(35, 36)
57a	„	1415 1501 1532	3	3	31–62
a_1	△	1458	1	1	*39–61*[1]?
a_2	B.	1416 1421	2	2	*36–44*[2]
b	P.	1421 1435(A) 1472 1502 1526	5	5	31–61, 75
b_1	△	1470 1471 1486 1520	4	4	*38*[1]
b_3	„	1461	1	1	*43–50*[1]?
g	P.	1461	1	1	(50–68)
58a	„	1430 1437 1439	3	3	35–68
b	„	1418 1461	2	2	35–43
c	„	1411	1	1	35–55
61a	„	1445 1449	2	2	34, 54
62a	„	1423 1448 1502	3	3	37–57
b	„	1400 1553 1566	3	3	34–59
b_2	B.	1467	1	1	———
63b	P.	1362	1	1	35–39
68b	„	1300 1442 1447 1532	4	4	31–61
69a	△	1472	1	1	*38–61*[1]?
71b	P.	1453	1	1	37–43
72a	„	1473 1488	2	2	31–46, 63
c	„	1480	1	1	33–47
74a	„	1400 1406 1437 1449 1452 1458 1460 1495	8	8	31–61
a_1	△	1566	1	1	*42–59*[1]
b	P.	1406 1432 1438	3	3	33–57, 76
b_1	△	1425 1458	2	2	*41*[2]?
c	P.	1459	1	1	33–55, 73
75b	„	1402	1	1	31–57
76a	„	1402	1	1	35–46
g	„	1474	1	1	*52–63*[1]?
m	„	1430	1	1	(46–64)
77a	„	1402 1403	2	2	34–41
78c	P.	1510	1	1	38–43
80e	△	1419	1	1	*44–61*[1]
94c	P.	1458	1	1	37
n	△	1476	1	1	———
v	„	1500	1	1	———

[1] P = *Prehistoric Egypt Corpus.* B = *Badarian Civilization.* △ = Drawn on Pls. XXIII–XXVIII.

"Polished-red" Ware

Type	Illustrations[1]	Fundplatz	No. of tombs in which pot occurred	Total No. of pots found	Dates
$11a_3$	△	1202	1	1	*33–37*[1]?
b_3	„	1535	1	1	*44–61*[1]
n	P.	1400	1	1	46
4	„	1415 1432	2	2	34–38, 61
7	„	1427	1	1	32–34
11b	„	1480	1	1	35–71
c	„	1402	1	1	35, 40, 63
d	„	1347	1	1	31–65
f	„	1496	1	1	(55–57)
15b	„	1427	1	1	32–39
16	„	1526	1	1	33–58, 72
18c	„	1432	1	1	(32–33)
22a	P.	1412	1	1	33–80
b	„	1425	1	1	*41*[1]?
c	„	1598	1	1	*44–48*?[1]
23Cl.†	„	1576	1	1	35–80
a	„	1426 1472 1527 1553	4	4	38–73
a1	△	1500	1	1	———
b	P.	1511 1517 1527 1528 1577 1578 (2)	6	7	41–72
c	„	1492 1498 1514	3	3	35–68, 80
c1	△	1536	1	1	*52–66*[1]?
d	P.	1513 1583	2	2	63–66, 77[1]*
24c	△	1476	1	1	———

† Cl. = Class. * See p. 58.

REGISTER OF POTTERY FOUND

'Polished-red' Ware—*continued.*

Type	*Illustrations*[1]	*Fundplatz*	*No. of tombs in which pot occurred*	*Total No. of pots found*	*Dates*
g	P.	1498 1510 1565	3	3	*43–46*[3]
k	„	1343 1548 1575 1596 1598	5	5	*44–48*[5]
k_1	△	1458	1	1	*39–61*[1]
l	P.	1565 1566 1591	3	3	47
m	„	1400 1440 1441 1442 1530 1532 1538 1550 1570(2) 1573(2) 1577	11	13	57–64
n	„	1339 1361 1466 1486 1487 1499 (A) 1550 1577	8	8	*36–38*[6]
p	„	1498	1	1	*38–67*[1]?
q	△	1558	1	1	*63–64*[1]
	„	1518	1	1	*75–77*[1]
33	P.	1356	1	1	35
38	„	1534	1	1	49–66
k	„	1474	1	1	52–63
40a	„	1347	1	1	39–70
b	„	1580	1	1	34–70
b_1	△	1498	1	1	*38–67*[1]?
c	P.	1357 1539 1550	3	3	40–65
$40d_1$	△	1558	1	1	*63–64*[1]
e	P.	1446 1565 1566	3	3	42–70
e_1	△	1570	1	1	*62–64*[1]
g_1	„	1512	1	1	*60–73*[1]?
h	P.	1566	1	1	*42–59*[1]
q	B.	1558	1	1	*63–64*[1]
41c	P.	1500	1	1	35–58
42	„	1370 1561	2	2	48–65
44a	△	1536	1	1	*52–66*[1]?
$45b_1$	„	1511 1558	2	2	*63–64*[3]
b_2	„	1534	1	1	*63–66*[1]
c_1	„	1518	1	1	*75–77*[1]
46a	P.	1400 1590	2	2	63–76
b	△	1559	1	1	*73–76*[1]
47a	P.	1418	1	1	34–61
56a	„	1598	1	1	31–56
63m	„	1432	1	1	(35, 36)
75a	„	1493	1	1	38–71
c	△	602	1	1	*66–73*[1]?
g_1	„	1539	1	1	*52–65*[1]
77d	„	1500	1	1	———
80s	P.	1440 1535	2	2	*57–61*[3]
82*l*	„	1570	1	1	*62–64*[1]
84a	„	1442	1	1	50, 63, 72
g	„	1355	1	1	(52–68)
i	„	1440 1441	2	2	(57–65)
85g	„	1327	1	1	(43–59)
93	△	1565	1	1	*42–66*[1]
b	P.	1514	1	1	37–67
d	„	1400 1357 1564	3	3	40–70
95b	„	1468 1539	2	2	46–72
96b	„	1427	1	1	*34–42*[1]?
98a	„	1327	1	1	50–65

"Fancy" Ware

11d	△	1202	1	1	*33–37*[1]?
14	P.	1457	1	1	35–53
20d	△	1400	1	1	———
44	P.	1581	1	1	50
$58f_1$	△	607	1	1	———
80t	„	1300	1	1	———

"White Cross-Lined" Ware

37b	△	1400?	1	1	———
44b	„	1457	1	1	*35=53*[1]?
47a	„	1202	1	1	*33–37*[1]?
47b	△	1400	1	1	———
c	„	1400?	1	1	———
l	„	1400?	1	1	———

"Black Incised" Ware

68a	△	1425	1	1	*41*[1]?
80r	△	1300	1	1	———

"Wavy Handled" Ware

19	P.	1464 1534 1536 1541 1550(2)	5	6	52–66
24	„	1542(2) 1565 1568 1580	4	5	65?
27	„	1541	1	1	(58–62)
41	„	1558(2) 1559	2	3	63, 64
42	„	1570	1	1	62–72
43b	„	1468(3) 1522 1542 1573 1577	5	7	57–66
$43b_1$	△	1362	1	1	*39–41*[1]
g	P.	1514	1	1	*47–65*[1]
47m	„	1512(2)	1	2	*60–73*[1]?
56g	„	1590	1	1	77
60g	„	1346	1	1	(77–78)

"Decorated" Ware

1m	P.	1548	1	1	*38–67*[1]?
u	△	1598	1	1	*44–48*[1]
8b	„	1581	1	1	*50*[1]?
$10g_1$	„	1408	1	1	*50–63*[1]?
m	„	1530	1	1	*57–64*[1]
20p	„	1590	1	1	*76–77*[1]
q	„	1578	1	1	———
22a	„	1579	1	1	*35–80*[1]?
23c	„	1469	1	1	*58–62*[1]?
31Cl.*	P.	1550	1	1	40–48
a	„	1300	1	1	47, 48
t	B.	1599	1	1	*38–67*[1]?
32l	P.	1363	1	1	*38–67*[1]?
34Cl.*	„	1538	1	1	51–58
$36a_1$	△	1566	1	1	*42–59*[1]
$43b_1$	△	612	1	1	*68–77*[1]
45s	P.	1344	1	1	*77*[1]?
$53a_1$	△	1575	1	1	*43–49*[1]
61m	P.	1342(B)	1	1	———
62a	△	1430	1	1	*46–61*[1]
63	„	1566	1	1	*42–59*
a	P.	1547	1	1	48–63
a_1	△	1458	1	1	*39–61*[1]
d	B.	1541	1	1	*58–62*[1]
67Cl.*	P.	1578	1	1	46–64
b	„	1400	1	1	———
d	„	1496	1	1	(52–58) (63-64)
d_1	△	1500	1	1	———
r	P.	1496	1	1	*55–57*[1]
68a	„	1531 1540	2	2	39–61
$78b_1$	△	1500	1	1	———

* Cl.=Class.

REGISTER OF POTTERY FOUND—*continued.*

"Rough" Ware

Type	Illustrations[1]	Fundplatz	No. of tombs in which pot occurred	Total No. of pots found	Dates
1a	P.	1408	1	1	50, 80
b	,,	1570	1	1	37–72
b_1	△	603A	1	1	*73–77¹?*
3a	P.	1357 1412 1448 1544 1594	5	5	33–64
b	,,	1362 1425	2	2	41
c	,,	1343 1411 1542	3	3	42–63
f8	B.	1521	1	1	*63–66¹?*
4	P.	1561(2)	1	2	58
6c	△	1571	1	1	*44–61¹?*
11	P.	1448	1	1	45, 57
17c	,,	1400 1430	2	2	*46–61¹*
d	△	1458	1	1	*39–61¹*
e	B.	1421	1	1	*36–44¹*
21b	P.	1421 1583	2	2	*34–65, 77¹**
d	,,	1541	1	1	*58–62¹?*
22a	,,	1338 1347(2) 1464 1542(6) 1564 1579	6	12	35–80
b	,,	1525	1	1	44–79
23a	,,	1400	1	1	39–73
b	,,	1448 1494 1518 1539 1550 1570	6	6	37–75
c	,,	1548	1	1	*38–67¹?*
h	B.	1579(2)	1	2	*35–80¹?*
24a	P.	1557 1558 1565	3	3	42–81
b	,,	1494 1513(2)	2	3	(63–69)
m	,,	1344 1578 1590	3	3	77
26c	,,	1419 1522 1541 1561 1568 1580	6	6	*58⁶*
e	,,	1362 1496 1557	3	3	78
f	,,	1583 1590(2)	2	3	*77²*
27	,,	1539(2)	1	2	52, 72, 78
33a	P.	1347	1	1	43, 66, 80
b	,,	1357 1514 1577	3	3	(43–71) 78, 81
34a	,,	1357 1525 1544	3	3	44–79
b	,,	1347	1	1	43–64
c	,,	1300 1355 1370(2) 1546	4	5	43–73
36	,,	1580	1	1	53–77, 38
d	△	609 610	2	2	*57²*
41c	,,	1496	1	1	*55–57¹*
42c	P.	1543	1	1	53
44c	,,	1485	1	1	60
u	,,	1539	1	1	*52–65¹*
45a	,,	1557	1	1	52–63
c	,,	1557	1	1	63–73
53a	△	1300	1	1	———
55a	P.	1300	1	1	34–74
57a	,,	1492	1	1	34–75
c	,,	1370	1	1	43–72
61a	,,	1412	1	1	56
62	,,	1575	1	1	42–77
a	△	1339	1	1	———
65b	P.	1464 1488 1514 1541 1557 1558 1570	7	7	47–65
c	,,	1345 1307(3) 1512 1519 1557	5	7	60–73
d	,,	1347	1	1	65–72
66a	,,	1439 1446 1558 1568 1580(2)	5	6	42–77
b	,,	1521	1	1	*63–66¹?*
g	,,	1300	1	1	———
m	,,	1520	1	1	———
66p	P.	1532 1539 1550(2) 1580	4	5	*57–61⁴*
67	P.	1300 1400 1341 1347 1458 1539 1580	7	7	39–74
69b	,,	1357 1419 1496(3) 1541(3) 1561 1563 1596	7	11	36–71
c	,,	1300 1407 1417(A) 1442 1496	5	5	36–68
g	,,	1466 1496	2	2	*55–57²*
h	,,	1582	1	1	———
j	,,	1440	1	1	*57–64¹*
r	,,	1343(2)	1	2	*42–63¹*
75	,,	1362	1	1	43–70
76d	,,	1577	1	1	*57–64¹*
g	,,	1580	1	1	*53–70¹*
81	,,	1300 1400(2) 1500 1328 1347(2) 1357 1360 1362 1363(6) 1418(2) 1419(3) 1420 1430 1440 1441 1442 1446 1492 1494 1495 1496(2) 1497 1498 1499(3) 1511(2) 1517(2) 1523(5) 1524 1525(4) 1527 1528 1530(3) 1531(2) 1532 1535(2) 1539 1548 1549(2) 1550 1551(2) 1553 1560(2) 1561 1566(4) 1598 1599	46	78	38–67
c	,,	1361(2) 1448	2	3	*49–53²*
f	,,	1519(2)	1	2	*73–79¹*
h	,,	1343(2) 1494	2	3	*42–63²*
g	,,	1440	1	1	*57–64¹*
p	,,	1574	1	1	———
s	,,	1431	1	1	63?
v	,,	1473	1	1	46
82	△	1596	1	1	*41–51¹?*
b	P.	1400 1408	2	2	38–63
83g	,,	1421	1	1	36–44
84	,,	1370(3) 1466 1522 1545 1559 1573	6	8	52–76
c	,,	1342(A) 1512 1545(2)	3	4	*60–73²*
d	,,	1338 1342(2) 1357 1363 1400(4) 1498 1512 1525 1530(5) 1576 1577 1578(2) 1580	13	23	*60–64¹⁰*
e	,,	1346(2) 1498 1511 1519(2) 1525 1541(2) 1568	7	10	*62–77⁷*
g	,,	1548(2) 1568	2	3	*42–67²?*
h	,,	1541(3) 1542(4) 1568	3	8	*58–62³*
s	,,	1592	1	1	*77¹*
t	,,	1468 1469	2	2	*57–62²*
85g	,,	1485	1	1	(36-72)
s	,,	1370(2) 1510	2	4	46
86g	,,	1564	1	1	*40–70¹?*
87	,,	1358	1	1	———
87a	△	1559	1	1	*73–76¹*
90s	,,	611a	1	1	*57–73¹?*
91a	P.	1400 1418(2) 1496(2)	3	5	41–65
b	,,	1356(2)	1	2	36–39
c	,,	1469 1544	2	2	31, 39, 62
92	,,	1418 1419 1423 1430 1448 1449(2) 1485 1535 1538 1561 1569 1598	12	13	44–61
93c	,,	1300 1441 1449 1469	4	4	(58–63)
94	,,	1361 1541 1575	3	3	49, 53
h	,,	1496 1523	2	2	59, (48–53)
k	,,	1496 (2) 1548	2	3	*55–67²*
l	,,	1582	1	1	———
p	,,	1338 1559	1	1	*73–76²*

* See text p. 58.

* See p. 58.

Type	Illustrations[1]	Fundplatz	No. of tombs in which pot occurred	Total No. of pots found	Dates
2a	P.	159			
6b	,,	135			
7b	,,	130			
c	,,	155			
g	,,	154			
12b	,,	142			
d	,,	149			
16b	,,	151			
16bb	,,	134			
f	,,	143			
g	,,	135			
n	,,	134			
19p	,,	158			
20	,,	157			
30b	,,	155			

Type	Illustrations[1]	Fundplatz	No. of tombs in which pot occurred	Total No. of pots found	Dates
1a	P. P. C				
a_2	,,				
d	T. I				
d_1	△				
f	T. I				
h	,,				
k	,,				
k_1	△				
l	P. P. C				
l_1	,,				
r	,,				
x_1	△				
3g	T. I				
k	,,				
4c	P. P. C				
5g	T. II				
k	,,				
l	△				
$7d_2$	,,				
8g	T. II				
9j	P. P. C				
p	△				
14m	T. I				
q_1	△				
18(Cl.)	T. I				
33n	,,				

[1] T.I = *Tar*
XXIX–XXX.

REGISTER OF POTTERY FOUND—*continued.*

"Late" Ware

Type	Illustrations[1]	Fundplatz	No. of tombs in which pot occurred	Total No. of pots found	Dates
2a	P.	1590	1	1	73–81
6b	,,	1355	1	1	60, 63, 80
7b	,,	1300 1519 1525 1566	4	4	39–79
c	,,	1557	1	1	55–81
g	,,	1541 1575	2	2	*43–49*[2]
12b	,,	1428	1	1	47–68, 78
d	,,	1492	1	1	81
16b	,,	1519 1557	2	2	79–81
16bb	,,	1347 1595	2	2	58–78
f	,,	1430	1	1	53–59, 80
g	,,	1359 1541	2	2	53–65
n	,,	1346	1	1	71–78
19p	,,	1583 1590	2	2	*77*[2]
20	,,	1573	1	1	*57–58*[1]
30b	,,	1558(4) 1559(2) 1594(2)	3	8	58–76
30c	P.	1559	1	1	73–79
g	,,	1518(9) 1590 1591(4)	3	14	68–78
h	△	1590(3) 1593(3)	2	6	*76–77*[1]
k	P.	1344 1583(4)	2	5	*77*[2]
m	,,	1557(7)	1	7	58–66, *77*[1]*
p	,,	1592	1	1	73–79
36n	,,	1344 1518(2) 1557	3	4	77, 78
s	△	1557 1583 1592	3	3	*77*[3]
w	P.	1348	1	1	———
40a	△	1590	1	1	*76–77*[1]
b	,,	1583(2) 1590(2) 1592	3	5	*77*[3]
43j	,,	1591	1	1	*68–78*[1]
53q	,,	1408	1	1	*50–63*[1]?
q_1	,,	1469	1	1	*58–62*[1]?

* See p. 58.

Protodynastic

Type	Illustrations[1]	Fundplatz	No. of tombs in which pot occurred	Total No. of pots found	Date
1a	P. P. C.	1207(6)	1	6	82
a_2	,,	,,	1	1	—
d	T. I	,,	1	1	79
d_1	△	,, (7)	1	7	—
f	T. I	,, (2)	1	2	79
h	,,	,, (12)	1	12	80
k	,,	,, (6)	1	6	81–82
k_1	△	,, (15)	1	15	—
l	P. P. C.	,, (5)	1	5	—
l_1	,,	,,	1	1	—
r	,,	,,	1	1	—
x_1	△	1208	1	1	—
3g	T. I	1312(2) M. Bf.	1	2	77–79
k	,,	1210	1	1	78–81
4c	P. P. C.	1207	1	1	—
5g	T. II	,,	1	1	77, 81
k	,,	,, (2)	1	2	78
l	△	1207	1	1	—
$7d_2$	,,	,,	1	1	—
8g	T. II	,,	1	1	77
9j	P. P. C.	1300	1	1	—
p	△	700	1	1	—
14m	T. I	1312(2) Pebble burnished	1	2	81
q_1	△	1207	1	1	—
18(Cl.)	T. I	,,	1	1	—
33n	,,	,, (2)	1	2	79
$36d_1$	P. P. C.	1207(4)	1	4	80
$37n_3$	Q.I.	,, (2)	1	2	—
$40c_1$	△	764	1	1	Archaic?
d_1	,,	726	1	1	,,
e	,,	763 858 960	3	3	,,
p	,,	960	1	1	,,
41p	,,	959	1	1	,,
t_1	,,	1317	1	1	Proto
$63o$	P. P. C.	1207	1	1	82
66t	,,	,, (5)	1	5	81
67b	T. I	,, (2)	1	2	80
j	,,	1210(2)	1	2	81
68b	△	1207	1	1	—
$73h_2$	Q.I.	1312	1	1	—
81f	P. P. C.	,, Fine rd.	1	1	77–80
82g	T. I	,, ,, ,,	1	1	81
$86f_4$	P. P. C.	,, Hd Bf.	1	1	80
$92l_4$	△	,,	1	1	—
93p	,,	1207	1	1	—
100*l*	P. P. C.	,, (3)	1	1	81
No Type					
1	△	,,	1	1	—
2	,,	,,	1	1	—
3	,,	,,	1	1	—
4	,,	761	1	1	Archaic?
5	,,	959	1	1	,,

[1] T.I = *Tarkhan* I; T.II = *Tarkhan* II; P.P.C. = Petrie & Brunton, *Protodynastic Corpus* (unpublished); △ = Drawn on Pls. XXIX–XXX.

REGISTER OF POTTERY FOUND—*continued.*

ARCHAIC, OLD KINGDOM, AND 1ST INTERMEDIATE.

Type	*Illustration*[1]	*Fundplatz*	*No. of tombs in which pot occurred*	*Total No. of pots found*	*Date*
4S1	△	1310(W) 1310(N)	2	2	IV
6E	Q. & B. II	1308 1310(W) 1323	3	3	,,
G	,, ,,	1300	1	1	,,
7C	,, ,,	1323	1	1	,,
Q	,, ,,	1315	1	1	VI–VIII
8M	,, ,,	1314	1	1	,, ,,
Z	△	1300	1	1	O.K.
9F	,,	1309(C)	1	1	IV
K	Q. & B. II	1309(C)	1	1	,,
11H	△	1300	1	1	O.K.
13M	Q. & B. II	1323	1	1	IV–V
O	△	1323	1	1	,, ,,
R	Q. & B. II	1323	1	1	IV–VI
Y	,, ,,	1308	1	1	V
17K1	△	1331 1351	2	2	IV
Q	Q. & B. II	1335	1	1	,,
19G	,, ,,	1340	1	1	IV
61N	Q. & B. II	1211	1	1	V
68S	,, ,,	1315	1	1	V–VI
V	,, ,,	1211	1	1	V
69G	,, ,,	1314	1	1	V–VI
71L	,, ,,	1323	1	1	V
77K	,, ,,	1308(2) 1323 1330	3	4	V–VI
L	,, ,,	1310(W)	1	1	IV
N	,, ,,	1323	1	1	,,
Q	,, ,,	1310(W) (2)	1	2	,,
90S1	△	1310(W) 1310(N)	2	2	,,
96X	Q. & B. II	1309(C) 1310(W) 1323	3	3	,,
No Type					
1	△	1201	1	1	,,
2	,,	1201	1	1	,,
3	,,	1201	1	1	,,
4	,,	1201	1	1	,,

[1] Q. and B.II = *Qau and Badari II* ; △ = Drawn on Pls. XXX–XXXI.

MIDDLE KINGDOM

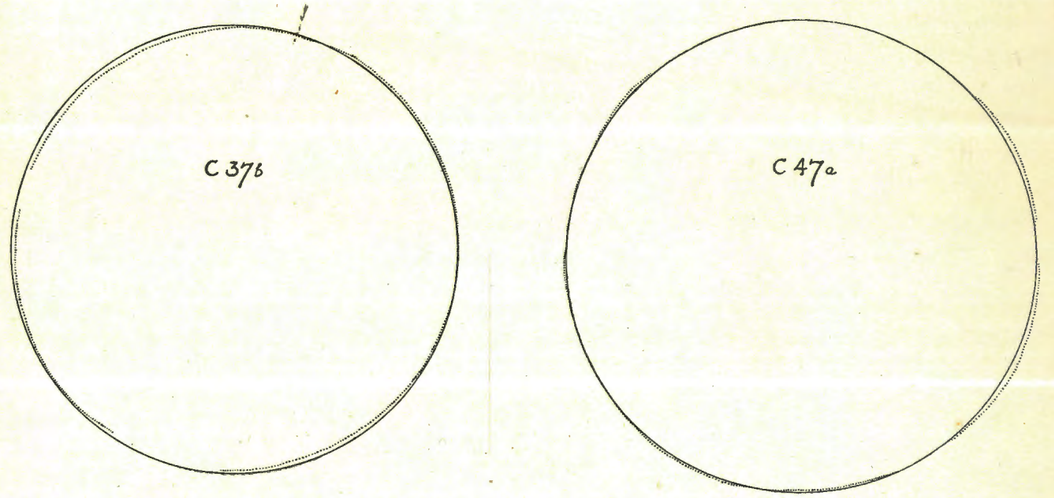
Type	*Illustrations*[1]	*Fundplatz*	*No. of tombs in which pot occurred*	*Total No. of pots found*
3L	△	1214	1	1
N	,,	,,	1	1
O	,,	,,	1	1
4A	,,	,,	1	1
A1	,,	,,	1	1
B	,,	1213	1	1
B1	,,	1214	1	1
B2	,,	,,	1	1
C	,,	1213	1	1
D	,,	,,	1	1
E	,,	,,	1	1
F	,,	1214	1	1
G	,,	1213	1	1
H	,,	1214	1	1
H1	,,	,,	1	1
L	,,	,,	1	1
N1	,,	,,	1	1
Q	,,	1213	1	1
8A	,,	,,	1	1
B	,,	1214(2)	1	2
B1	,,	1213	1	1
B2	,,	,,	1	1
B3	,,	1214	1	1
C	,,	,, (3)	1	3
C1	,,	,,	1	1
D	,,	1213	1	1
D1	,,	1214	1	1
E	,,	,,	1	1
E1	,,	1213	1	1
E2	,,	1214	1	1
F	,,	1213(3)	1	3
F1	,,	,, (2)	1	2
F2	,,	1214	1	1
G	,,	1213(3) 1214(2)	2	5
G1	,,	1214	1	1
G2	,,	1213	1	1
H	,,	1214	1	1
K	,,	,,	1	1
L	,,	1213	1	1
L1	,,	1214	1	1
M	,,	,,	1	1
M1	,,	1213	1	1
10A	△	1213	1	1
B	,,	,,	1	1
C	,,	1214	1	1
D	,,	,,	1	1
E	,,	,,	1	1
F	,,	,, (3)	1	3
G	,,	,,	1	1
H	,,	,,	1	1
K	,,	,,	1	1
M	,,	1213 1214(2)	2	3
11B	,,	1214(2)	1	2
C	,,	,,	1	1
37C	,,	,,	1	1
52C	,,	1213	1	1
F	,,	,,	1	1
J	,,	1214	1	1
J1	,,	,,	1	1
M	,,	,,	1	1
M1	,,	,,	1	1
M2	,,	,,	1	1
66B	,,	1213	1	1
H	,,	,,	1	1
M	,,	1214	1	1
O	,,	1213	1	1
79B	,,	1214	1	1
E	,,	1213	1	1
F	,,	1214	1	1
H	,,	1213(2)	1	2
J	,,	,,	1	1
K	,,	1214	1	1
O	,,	,,	1	1
Q	,,	,,	1	1
V	,,	1213	1	1
X	,,	1214(2)	1	2
Z	,,	1213	1	1
79?	,,	,,	1	1
96B	,,	,,	1	1
E	,,	1214	1	1
F	,,	,,	1	1
H	,,	,,	1	1
J	,,	,,	1	1
M	,,	,,	1	1
98B	,,	,,	1	1

LATE

No Type										
1	△	1306	1	1	2	△	1306	1	1

[1] △ = Drawn on Pls. XXXI–XXXV.

DIAGRAMS



These diagrams illustrate the close correspondence to circles of the mouths of " White Cross Line " pots. The pots were hand made, at a date before even the simplest wheel had been invented. They may have been built up on a mat resting on sand, which could be turned with one hand. However, the rims do not give the impression of having been smoothed by turning. (See the discussion on p. 57).

O. H. M.

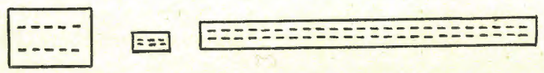
CHAPTER V

THE BEADS

Typology.

The typology of beads is as difficult, or more difficult than that of pottery and infinitely more tiresome. Two main systems of classification hold the field to-day ; that started by Engelbach in *Harageh* (1923) and developed by Brunton in *Badarian Civilization* and *Qau and Badari II*, and that propounded by Beck in " The Classification and Nomenclature of Beads and Amulets," *Archæologia, Vol.* LXXVII, 1928.

Either system provides a satisfactory method of making a complete record of the material found without inordinate labour, but each suffers from an inherent defect. Beck's classification is by conventionalised geometric form, and proportion, and there are two difficulties in its application. Firstly the beads are seldom so sharply differentiated in their shapes as are the geometrical drawings, so that it is often difficult to decide whether a bead is I D 1 b (a long barrel) or I D 1 f (a long truncated convex bicone), and two almost identical beads may easily be typed by the same person to two widely different conventional shapes, if an interval of time elapse between the two typings. Secondly, since the second criterion of division is by proportion (the first being by shape), the following three beads



all fall into the same class, that of long cylinders (I D 2 b). On the other hand, Brunton's corpora have grown as the material was found, and the classes are not geometrically defined. Thus the border line between the debased forms of different classes has often grown thin, and identical beads may again be typed to different classes, though with less misleading results to the reader who is studying the drawings. However, there is no perfect system of recording beads—if every bead were drawn the resulting mass of material would yield no data for statistical comparison, or similar studies—and, easy as it is to discover the difficulties in existing systems, it is a very difficult matter to devise one that shall be nearer perfection and as practical.

Nevertheless, some of the difficulties could be overcome by a judicious combination of the two methods. The advantages of each system, which need to be retained in any new one, are the clear-cut divisions of Beck—which prevent the confusion of classes, and the subtler distinctions of Brunton's drawings—which facilitate recognition. To achieve this, Brunton's drawings need to be rearranged under Beck's divisions, doing away with different corpora for different periods. There is one objection which may be raised to all this. There are already five symbols for some of the shapes in Beck's corpus, and the sub-types would add at least one more. A bead has also its register number, tomb number, and sometimes burial, bead and string numbers, and when it reaches a museum it acquires an accession and a registration number. It would, thus, be possible

for a bead smaller than a pin head to carry the following label : B.M. 13.8.40 : 999, 782, Armant 1709, A.1.23, Corpus IX C fb 126, and this is a little ridiculous. But there seems to be no way of avoiding this situation if a systematic and uniform method of recording is to be used.

To start a new corpus to record the beads from the Armant cemeteries would not be justified, since they are not in sufficient quantity ; moreover, for such a scheme to be of value it must bear the approval of a large body of archæological opinion, and it is for the Committee of the International Corpus of Egyptian Pottery to consider any plan for an extension of their work into other fields. It may be pointed out that, though this project would entail some hard work, it would serve when finished for all places and all periods.

The register of beads given here (pp. 101–116) classifies by both current methods. All the Predynastic and Protodynastic beads are typed to *Bad. Civ.* Pls. XLIX and L, and beads of a later date to *Qau and Badari II*, Pls. XCIII to CIV. New types, which are marked △ in the register are drawn on Pls. XLI–XLII. All the beads are also typed to *Beck* and the types to which reference has been made are reproduced on Pls. XL[1] together with some new types which have been added. The addition of new types needs some explanation. Beck says (p. 9) : " . . . the ' ends ' of beads may be flat or slightly concave or hollow conical—that is to say, a part of a cone in which the smaller portion of the cone is nearer the centre of the bead. If, however, their surface has a deep hollow cone, it is generally best to consider it as part of the perforation. See perforation types I, III, and V. If the ' ends ' are so convex or conical—that is to say, part of a cone in which the smaller part of the cone is farther from the centre of the bead—that they become a feature of the bead, they should not be considered as ' ends ' but as a part of the profile of the bead.

" The ends of beads are sometimes specially shaped. Some tubular beads have the ends ground alternately convex and concave, so as to fit together. Some others have a very deep concave end. In this case it is best to describe the bead, if otherwise regular, under its correct class and note that the end is very concave."

The new types which have been added here are those with ends varying from the types published in *Beck*. It is not possible to treat these ends as part of the perforation, since they are entirely distinct from it. It would be much more tedious to describe the different types of ends than to draw the various combinations in type series, so the latter course has been adopted.

Some latitude has been taken in typing to Brunton's corpora. Primarily they provide the size, which is not given by the Beck number, and they also give a clue to the character of the bead not to be found in the stylised types of Beck. Since Beck's classification of perforations has been used this takes precedence over that shown in the corresponding Brunton type. Anomalies have been avoided wherever possible, but, should a bead have the type number 78 H 9 (*Bad. Civ.*) and the perforation type III, this would mean that the bead was of the same size and shape as that in *Bad. Civ.* but with a conical boring from one end.

Beck's perforation types are also reproduced on Pl. XLI. It is not always easy to distinguish between perforations II and IV, even when the bead is held up to the light and examined with a lens, since IV may be a straight-through perforation from one end, or a perforation from both ends that has met exactly in the centre. Obviously, in a very fine perforation it may be difficult to find the traces of a join.

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[1] A few types, not in Subdivision I (regular rounded beads), have been omitted. Their shapes can be seen on Pl. XLI in the *Brunton* Corpus types.

MATERIALS.

We were fortunate in obtaining the help of Mr. H. B. Maufe in identifying the materials of the beads. He went through the whole of the beads and where there was any doubt about the material of a bead it was extracted for closer examination. Mr. Maufe examined microscopically fourteen specimens himself. Mr. Beck kindly reported on over a hundred specimens and several other people were good enough to identify miscellaneous materials. All these reports follow on pp. 83–100. Dr. Wilfrid Jackson identified the shells during the progress of excavations.

Several of the materials are exceptionally interesting. The green and yellow fluorspar from 1462 and 1411 are rare. Wood opal does not appear to have been identified before. The glazed serpentine bead from 1310A, is, we believe, the first identification of this material, though Beck (*Ancient Egypt*, 1934, Part II, p. 73) discussing glazed steatite says : " The original stones used to make the base are very different . . . and I am not sure that they are all steatite." The altered steatite from 1566 is a very unusual bead in appearance. The use of beetle femora and thoraxes, 1566 and 1502, has not been previously recorded.

The two most important identifications are those of specimens of undoubted glass of the Old Kingdom and Middle Kingdom. Equally interesting is the discovery of a glazed carnelian, two amber, and a bituminous bead in the Predynastic period.

The Old Kingdom glass beads occurred in 1310. One was identified by analysis in 1310A, and two in 1310C by comparison with this. There were five Middle Kingdom glass beads, one dark-blue clear glass from 1213D, a robbed burial, and four pink clear glass found together with typical Middle Kingdom beads in the neighbourhood of the tomb. Their date is thus open to doubt on archæological grounds. The identification of the pink beads gains support from a similar bead found by Brunton at Qau (*Qau and Badari II*, p. 21, tomb 1521, and Beck, *op. cit.* No. 14).

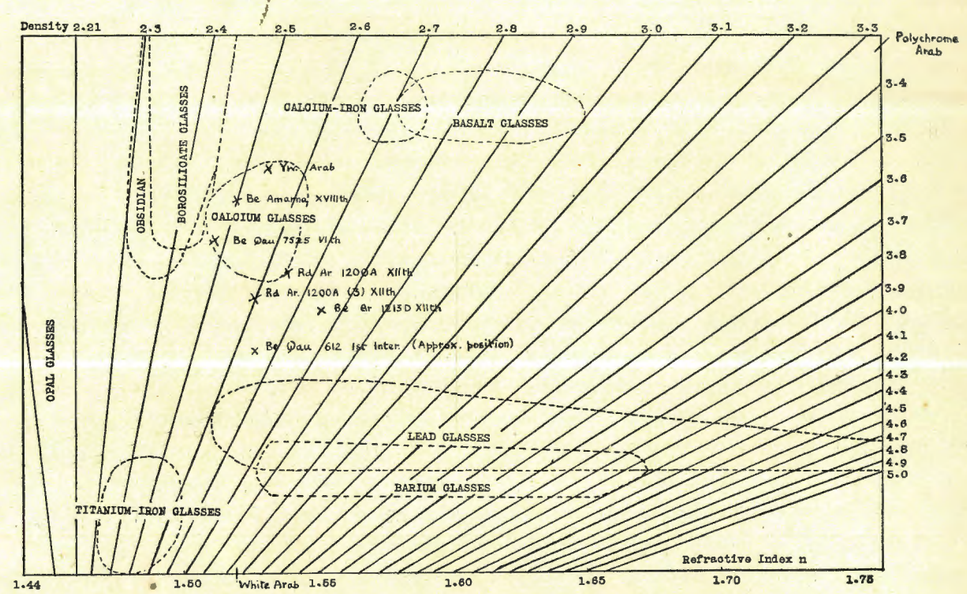
The possibility of the blue bead being intrusive is manifest, but the probability of only one small bead dropping off a robber into a burial is slight. Further light is thrown on these by the use of Mr. F. A. Bannister's " A chart for determining the composition of glass imitation gems," first published in the *Mineralogical Magazine*, Sept. 1929, Vol. XXII, No. 126, p. 147. This is reproduced below. It will be seen that the red and blue beads examined by Mr. Bannister fall just between the calcium and lead groups, but nearer the calcium. Through the courtesy of Miss Mary Shaw, Dr. S. R. Knockolds sent the specific gravity and refractive index of the bead 612 from Qau and Mr. Bannister was able to examine Qau 7525. These fall close to the Armant group, above and below it. It seems possible that the pre-Eighteenth Dynasty glass beads may form a group slightly separate from later material, but more of the latter must be examined before plotting can be adduced as strong presumptive evidence of date.

There were altogether eight examples of glazed carnelian. The specimen which was analysed was from 1580 (S.D. 53–70), one was found in 1370 (S.D. 46), and six in 1572 (no S.D.). The last seven identifications are by appearance only, but certain features are so characteristic that there seems little danger of a mistake.

Professor Doran was kind enough to examine three beads apparently of a resinous material. His report on p. 96 ff shows that two of these were amber and one of a bituminous material. Amber occurs occasionally in the Mediterranean and the Persian Gulf. Bitumen occurs in the Dead Sea, but its use in Egypt prior to Græco-Roman times has been considered doubtful

according to Mr. Lucas (*Anc. Eg. Mat. & Ind.*, p. 235ff). Professor Doran suggests ozokerite as an alternative.

The beads from 1200 A and B, of " Mars yellow," " Brown ochre " and " Roman ochre "



A chart for determining the composition of glass imitation gems

appear to be made of new material, since the analysis does not correspond with faience or frit, but it is here described as a variety of faience.

The only materials which have not been analysed or otherwise examined are the clay and pottery beads, but there is little doubt about the composition of these.

COLOUR.

Colour is one of the few qualities for which no absolutely accurate system of recording has been devised. At the present moment the question has been put to Messrs. Winsor and Newton, who are investigating the possibility of producing a volume by means of which every hue, shade, tint, and shaded tint could be accurately recorded. They have already published *Colour Science*, by Wilhelm Ostwald, translated by J. Scott Taylor, M.A. (two vols.) and *The Ostwald Colour Album*, arranged by J. Scott Taylor. The latter contains 680 tints, shades, and shaded tints, and, though it does not give perfect definition, it is far the best available method. This album is derived from the Ostwald Colour Solid which has a chromatic scale of forty-eight hues (the album has only twenty-four) and gives a total of 2,535 hues, tints, shades and shaded tints, which blend into each other in such a way that it is not possible for the normal human eye to detect any closer divisions. If a volume giving all the gradations of the solid be produced, it will supply a simple and completely satisfactory method of recording colour, but the expense would be very great. Before we had the opportunity of seeing the above volumes and gaining the assistance of Mr. Arthur B. Allen of the staff of Messrs. Winsor and Newton, we had already recorded the beads

with references to the same firm's *Specimen Tints of Artists' Colours*, and this system has been retained, the specimens used being reproduced on Pl. VII. For convenience the Ostwald reference numbers have been given beneath each of the tints, but this must not be interpreted to mean that the beads were exactly of the tint given for that symbol in *The Ostwald Colour Album*. Indeed, it is intended that some little latitude in interpreting the colour values given be allowed. A fairly wide range of colour is supplied in the album, and these colours have names which are accepted generally among colourmen and artists. The use of any one of these in the register means that that specimen was the nearest in the volume to the colour of the material to be recorded. The colour of the material might be a shaded tint of the specimen or even a little to one side of it on the chromatic scale, but, at the same time, by reference to Pl. VII it is possible for the reader to get a very good idea of the material. By the old method of describing things as " reddish-brown," " green-grey," or " a dark carnelian," practically anything might be meant according to the differing interpretations placed on the words by the author and reader. By the present system, though there may be some slight inaccuracy in the description, at least the author's intention is perfectly clear to the reader.

Some notes on individual strings will be found on p. 80 ff.

MANUFACTURE.[1] (*In collaboration with Mr. J. Hart*).[2] The manufacture of beads of natural materials appears to have received less attention than any other aspect of the study of beads. Yet it seems worthy of investigation, since the typology may often be affected by manufacture, and since a close study of such a subject will often produce unexpected results which add to our knowledge of other subjects.

Previous suggestions about the methods of manufacture have been confined to flaking and grinding down on a flat surface or in a groove or slot in a gritty stone. Though these methods are feasible for some cylinder and disc beads and a few rough barrels, it is impossible to believe that the

[1] An explanation of certain terms used here is advisable as they are used throughout (with one variant) in a technical engineering sense. The following definitions are taken from *Lockwood's Dictionary of Mechanical Engineering Terms*, edited by J. G. Horner, London, 1902. " *Lap*. A body of soft metal, such as lead, tin, or brass, which forms the matrix or support for the emery powder or pumice powder used in grinding surfaces of hardened steel, chilled iron, or other substances too hard to be attacked with ordinary cutting tools." This term has been used for the flint points as the most suitable, because, although they are not soft, they were certainly used with an abrasive and, except when first used, had no cutting edge. " *Drill*. A tool for boring [*sic*] holes in metal or wood, and revolved either by some form of hand brace or special machine. Drills may be flat towards the point and simply bevelled, or also of the twist type. The flat drills may have either single or double cutting edges. " *Boring*. The operation of making or finishing circular holes in wood or metal. In strictness, the term boring has reference to the cutting out of holes of large size, the term drilling relating to those of small diameter. Still the term is . . . loosely applied . . . a more comprehensive definition would be, that boring relates to the formation of holes with tools having a single cutting edge only, while drilling signifies the formation of holes with tools having two cutting edges." By neither definition can any of the tools used with the beads be called borers, since they are of small diameter and, when the flint points were used as drills with soft stones, they certainly had multiple cutting edges. " *Chatter*. Caused in machine work by want of rigidity in the cutting tools. It occurs chiefly in cutters set in a revolving cutter bar, when the bar is not sufficiently stiff." " Chattered " has been used to describe a type of perforation in which the walls are covered with incipient cones of percussion, which must surely have been caused by chatter. " *Grinding*. The abrasion of metallic surfaces on a grindstone or emery wheel, or lead lap, or grinder. *Dead-hole*. A hole which is not a thoroughfare hole ; that is one that is bored only for a certain distance into a piece of metal." Metal is, of course, specified in this dictionary on account of the subject. The *Oxford New English Dictionary* lacks any of the technical uses of most of the above words.

[2] We were fortunate in obtaining the help of Mr. J. Hart, the lapidary, of Hatton Garden, for this investigation, and he examined a number of beads and photomicrographs of beads. Much of the following information must be attributed to him, but, since he could not spare the time to work steadily through the beads he must not be blamed for any errors of description in the register.

perfectly symmetrical barrel, pear-shaped, spheroidal and other beads could have been made in this way.

Surface.

The first process with all hard stone beads was to chip or flake them to rough shape. Pl. XXXVII, Fig. 1 shows a series of beads in this state now at University College, London. The first stage with soft stone has not been determined, but may have been cutting. Steatite could be cut with a flint blade, though the use of an abrasive in perforating this stone (p. 71) points to a different process.

It appears that three main methods of finishing the surfaces of beads were employed : " rubbing down," " groove-grinding," and " turning."

By " rubbing down " is meant rubbing the bead on a flat surface by hand, or, with reference to amulets, rubbing the surface with a tool and some abrasive. Pl. XXXVI, Fig. 6 (scene from the Tomb of Aba, Sixth Dynasty *Deir el Gebrawi* I, XIII) shows, at the bottom left-hand corner, a man rubbing down the end of a carnelian disc bead on a block, probably of stone—judging by its rounded shape. The bead is much enlarged by the draughtsman to make it readily apparent. Pl. XXXVII, Fig. 2 shows the profile of a bicone bead which has been rubbed down, and Fig. 3 the end of the same bead.[1] In Fig. 4 can be seen the V slot at the back of a fly amulet showing rubbed down surfaces.

" Groove-grinding " refers to the method of rubbing a cylinder bead (or possibly several disc beads held together on an axis) in a suitable groove in a hard gritty stone, usually sandstone or quartzite. Pl. XXXVII, Fig. 5 illustrates a block of quartzite with a groove in it, on which a bead has been placed, to suggest the method of manufacture. This is an exhibit in University College, London. It is suggested that barrel beads were fastened on a thread and that the thread was then pulled downwards from opposite ends alternately, but this does not seem a very probable procedure, and could not produce the perfectly symmetrical beads which are found. Some cylinders and disc beads have longitudinal scores caused by this method of manufacture. Possibly the disc beads were fixed on a rod or stick and ground down together ; but these beads were certainly frequently sliced and they may have been worked as cylinders.

The evidence for slicing can be seen on Pl. XXXVII, Fig. 6 where two steatite beads from 1482 are shown. The perforations are clearly truncated. Dr. Mackay tells me that in India he has found still clearer evidence in beads with saw marks running at varying angles as the craftsman turned the bead round to cut it. Such marks could not be produced by " rubbing down."

The expression " turning " in this context does not bear its usual meaning of turning on a lathe, but that the bead was rotating when being smoothed. This was probably done by attaching the bead to the end of the shaft of a drill, and then turning it in a wooden cup or recess (or against a flat surface) by rotating the shaft in the usual way, feeding it, of course, with an abrasive. Pl. XXXVI, Fig. 5 (*Rekhmaré* XVII) shows, at the top right-hand corner, a man using a bow-drill and operating three shafts at the same time. He may be either perforating the beads or turning them. Beside him is a basin full of beads which are being threaded by the man behind him. Since smoothing was the final process before threading, it might be argued that the beads are

[1] Mr. Hart is doubtful about this and suggests that the apparent scorings are caused by the weathering out of the softer parts of the stone.

being turned, but the juxtaposition of the two subjects is a very unsafe guide to their order in time, especially as it is easier to associate the processes of perforating and threading than those of turning and threading. (Using three shafts at once is a very difficult feat and it may be suggested that the three shafts are merely three different attempts on the part of the artist to portray the same shaft, but the drawing of the hand is evidence to the contrary. The artist portrays clearly the arrangement of the fingers while holding two shafts, and it is clear that this is an attempt to show them holding all three. Notice also the string twisted round each shaft.)

Pl. XXXVII, Fig. 7 shows a string of beads from 1312 all of which, with the exception of the first two, cannot have been manufactured in any way other than turning. Fig. 8 shows five symmetrical beads, the first and second of steatite, the fourth and fifth of agate, and the sixth of carnelian, and one asymmetric bead, the third, also of carnelian, all from 1424A. The third bead shows evidence of turning, since the part of the profile furthest from the perforation is well smoothed, whereas the remainder still shows the marks of chipping. This occurs on other beads from the same string, and on a carnelian from 1554, and is proof of the turning of the beads, since this effect would not be produced by any other method of manufacture. Further evidence for turning is the rounded end of the first bead, the other end being flat. The perfect symmetry of the remaining beads also suggests turning, though an alternative explanation is that they are the cores of larger perforations made with hollow laps. The Germans manufacture some beads by this method to-day. A bead from 1443 (Pl. XXXVII, Fig. 9) has in the edge a hard lump which has withstood the abrasive, and the normal material can be seen running up to it in an inclined plane on one side. Had this bead been " groove-ground," the material would have worn down evenly on each side of the projection, since the friction would have been along the axis of the bead, which must, therefore, also have been turned. Several beads have rounded ends and these would not have been formed by any method of rubbing down or groove-grinding, but would form during turning, if the end of the bead pressed against the bottom of the recess in which it was being turned. Some strings have one or two only of these beads—were they made deliberately for end beads ? In 1212, the bicones show scoring due to rubbing down, while the short barrels and disc barrels show no marks at all, though made in the same material, and this is probably evidence that they were turned. Most bicones appear to have been rubbed down, though one of carnelian from 1547 seems to have been turned. The discovery of this method of finishing beads would be almost certain to arise out of the method of perforating with a rotating lap since, when the beads were being perforated, held in the mastic, some would inevitably turn in their seatings, and abrasive powder from the lap would slip down between the bead and its seating. Sooner or later someone would apply the fortuitous discovery. Wood was almost certainly the solid body in or against which the bead and its abrasive was turned.

The present procedure in polishing beads is to use, first a lead wheel with emery, second a wood wheel with fine emery (at this stage the beads are smoothed, and this is the state to which the Predynastic beads were brought), next felt and pumice, and lastly leather and oxide of tin. For certain stones, especially very hard ones or those that are not homogeneous, the polishing is done with a pewter wheel and " Derbyshire rotten-stone." Wood and sand would serve just as well as wood and fine emery. Pliny describes as valuable for putting the final polish to stone " Thebaic stone " from Egypt. (XXXVI, 9–10) Derbyshire rotten-stone is disintegrated limestone containing silicious material, and Thebes is a place where a similar material might quite possibly be found. The beads from Armant are not polished in the lapidary's sense of

the word, but later beads were, especially Royal beads, and " Thebaic stone " was probably the abrasive.

The finish of the beads in the register is mostly described as " rough," " dull," or " smooth," terms which are self-explanatory if it be remembered that only beads with a high degree of finish are termed polished. The turned beads in Fig. 7, Pl. XXXVII are only smooth. A few beads better finished than the rest have been described as " very smooth," and two beads were actually polished, a Middle Kingdom carnelian long barrel from 1213H and a carnelian pebble pendant of uncertain date from 1300. A few pottery and clay beads were very roughly finished, and some hard stone had much of the flaking remaining, frequently where turning had not affected one part of the periphery, owing to the asymmetry of the bead about its axis.

Perforation.

Five different degrees of finish of the perforation are referred to in the register, " drilled," " chattered," " rough," " dull " and " smooth-ground." All of these, except the rough, are illustrated on Pl. XXXVIII, Figs. 1–4.

By " drilled " (Fig. 1) is meant a perforation in which the marks of the cutting edge of the drill can be seen on the sides of the perforation. This is found only in soft stone, and the bead illustrated from 1534 is of serpentine. The edge of the drill was certainly irregular, and this suggests that a flint point was used similar to No. 6 on Pl. XXXVIII, Figs. 5 and 6 (all from the Wadi Ghuzzeh) and a number of those shown by E. Macdonald in *Beth Pelet* II, Pl. XXII, Fig. 1. It might be expected from the nature of the perforation and of the material that the flint point would have been used without any abrasive, but this was not so (see p. 79).

The next bead on Pl. XXXVIII, Fig. 2, a carnelian from 1462, has a " chattered " perforation.

By this is meant a perforation in a hard stone in which the surface is extremely rough and pitted with incipient cones of percussion. It is probable that this effect was caused by a flint point on a stone of similar material, possibly insufficient lubricant being used with the abrasive.[1] Rough ground is simply intermediate between chattered and dull ground. A dull ground perforation is shown in the next figure (3) on a carnelian bead from 1312C. This, like the chattered example, has a perforation of type I (double cone) and it is not possible to say whether this is a chattered perforation subsequently smoothed, or one that was ground to a dull finish in the first place. The latter is the more probable hypothesis. Fig. 4 shows a smooth perforation in a carnelian bead from 1312a. Near the edge of the bead the perforation is almost as smooth as the end of the bead. Dr. Mackay tells me that some of the beads from Mohenjo Daro are finely polished inside, and that this is presumably done to eliminate the appearance of a white centre in a bead which has a rough perforation.

Laps.

The laps used were of various kinds ; V-shaped, pointed, round-ended, flat-ended, and tubular. Plate XXXVIII, Figs. 7, 8, 9, and Pl. XXXIX, Figs. 1 and 2 are photomicrographs of dead-holes left by these different tools. It must not be too hastily assumed that the differences

[1] Mr. Hart is doubtful of this explanation. He says that the impression given is that of the bead having been fired to bring out its colour, after perforation and before smoothing.

were fundamental. Lap No. 1 in Figs. 5 and 6, Pl. XXXVIII[1] would produce a round-ended perforation, No. 2 a flat-ended, and No. 5 might leave a mark deceptively like that left by a tubular lap, though all these points are of flint and the differences in the ends are due only to wear. (No. 5 is particularly remarkable since it would serve to perforate cylinder beads 3 cm. in length.) Moreover, reference to *Beth Pelet II*, ibid. shows flint points of various shapes and in different stages of wear, and the second and third points in the top row could have been used to produce the chattered and dull perforations referred to above (Pl. XXXVIII, Figs. 1–4), and Nos. 9–14 would make a V-perforation like that on the steatite bead, the third in string 1597, shown in Fig. 2 of Pl. XXXIX.

The pointed perforation in a calcite bead from 1357 (Fig. 8, Pl. XXXVIII) might have been made by No. 14 in the third row. There are several with flat and rounded ends that would produce perforations like Fig. 7, a dead-hole made by a flat-ended lap in a steatite bead from 1212, and Fig. 9, the work of a round-ended lap in a similar bead from 1597. Even the apparently tubular perforation in the Twelfth Dynasty hæmatite bead from 1213A (Pl. XXXIX, Fig. 1) could have been made by an eccentric point like No. 6 of the third row.

Nevertheless, it is improbable that many of the long perforations, such as those of types IV and VI were produced with flint points, for even the narrowest laps from the Wadi Ghuzzeh would only serve for the wider perforations. Moreover copper laps are known from the E.P.III (Badarian) period (see *Bad. Civ.*, Pl. XXVI, p. 33) and the tubular lap was a familiar object in the Old Kingdom (see Petrie, *Pyramids*, Pl. XIV, p. 175). A reed or a rush could be used as a tubular lap, but copper is the more probable substance.

Apparatus.

In dynastic times at least two kinds of apparatus for driving the laps were used, the bow-drill shown in Fig. 5, Pl. XXXVI, and another drill which is being used by the two centre figures in the bottom register of Fig. 6.

Mr. Davies comments on the latter scene in the text (N. de G. Davies, *Deir el Gebrawi I*, p. 20 (Pl. XIII)), and says : " The tools and blocks of carnelian are doubtless very much magnified for the sake of clearness. The latter may only be carnelian beads of the usual size which are here being pierced, whether by a turning motion, as we should expect, or by ' jumping ' blows, as the action rather suggests. From the yellow colour of the tool, with blade and handle, it would seem to be of wood, and such an instrument might perhaps be employed if furnished with a hard point or used with emery powder."

A " jumping " motion for boring cylinder beads (or any beads for that matter) is technologically unlikely ; moreover, no bead that we have examined shows score marks that could have been due to this method of manufacture.[2] Further, the bead is on the ground with nothing to hold it. With the bow-drill method there is a large wooden block and the beads must have been held in this by some kind of mastic, probably resin. It is just possible that the handle of the drill is resting in or on the ground, and that the upper object is the cylinder bead much enlarged. If this is so, the bead is being turned by the craftsman and the attitude of his hand is perhaps

[1] From Wadi Ghuzzeh, reproduced by kind permission of Prof. Petrie. See also *Cem. of Abydos II*, Pl. III, Fig. 9.

[2] Mr. Beck tells me, however, that this method of perforation is used to-day in West Africa, but in that case the perforations are made in a large block before trimming to minimise risk of splitting. A set of the instruments is in the Ethnographical Department of the British Museum.

suggestive of this, but only, it must be admitted, if the bead be of gigantic size. The lower and smaller block is red, and the shaft and upper block yellow. Though this seems to favour the supposition that the upper block and shaft form one and are of wood, it is worthy of notice that the ideogram in the text above, shows the handle of the instrument as red. Another theory must be mentioned, though there is nothing in our knowledge of ancient Egypt to support it. The drill might be worked on the Archimedes principal if the upper cylinder contained a spiral track on the inner surface, and the shaft had a projection to travel in the spiral as the cylinder was pushed up and down, but this would be clumsy without a spring, which the ancient Egyptians almost certainly did not have. Alternatively the upper cylinder might be merely a heavyish block holding the lap to its work and acting as a fly-wheel. The difficulty about both these theories is the absence of any method of holding the bead. The difficulty about turning the bead on the drill is that it would have to be started another way, and in that case there could be little advantage in transferring it.

The Abrasive.

There has been much discussion about the abrasive used with the ancient Egyptian laps. Sand has been suggested by Lucas (*Ancient Egyptian Materials and Industries*, 1934, p. 70),[1] Petrie (*Pyramids*, p. 175), Quibell & Green, (*Hierakonpolis* II, p. 17). Emery has been suggested by Petrie (*The Arts and Crafts of Ancient Egypt*, pp. 73–74), and pumice by Reisner (*Mycerinus*, pp. 116–118). By the greatest good fortune we found, in a dead-hole in a steatite bead from 1597 (No. 3), Pl. XXXIX, Fig. 2, a thin whitish coating firmly adhering to the surface. Mr. Kirkaldy has shown that this is crushed chert or flint (p. 93). Another substance which was probably used is the chips from the beads themselves, which would be handy in the workshop, and, after preliminary crushing in a mortar, would make an ideal abrasive. Moreover, dust from the bead itself would be formed as the lapping progressed, and, when the bead was of hard stone, this would add to the abrasive.

OTHER BEADS.

The glazing of stone beads has been discussed fully by Beck in *Ancient Egypt*, December, 1934 and June, 1935.

Moulded has been used to describe the manufacture of beads of faience, and frit, which were made in a mould, whereas *modelled* has been used for clay and pottery beads which were probably shaped with the fingers.

Caps. Two of the gold caps on beads 11 and 15, from 1310B, were perforated after they had been placed on the bead, by piercing from without. No doubt this helped to hold them in position.

Unusual Ends. Some beads, *Beck*, new types, 6 and 7, g, h, and k, in various combinations, have concave and convex ends, ends with a trough between the periphery and the perforation, and ends with a double sine curve (see Pl. XXXIX, Figs. 3 [1424], 4 [1443], and 5 [1212], respectively for photographs, and Pl. XLI for drawings). The latter occur only in steatite. By breaking a steatite bead it was easy to see that the shape of the end was not a natural fracture, nor was it due to any form of slicing. Probably in this soft stone the shoulder of the flint point

[1] Mr. Lucas tells me that he has recently found clear evidence of the use of sand in a large limestone boring at Sakkara.

quickly cut down into the end of the bead. The double sine curve might be caused by the shoulder of a lap travelling at an angle to the axis of the bead and a crooked perforation is found in this shape of bead. Some of the flint points in *Beth Pelet* II, Pl. XXII, have shoulders which could cause these shapes.[1]

The perforations are frequently at an angle to the axis of the bead. Might this not be due to the use of three shafts simultaneously with the bow-drill ?

WEAR.

Several whole shells used as beads have a perforation that has originally been circular and has been worn to a long irregular oval with the weight of the bead. One bead in 1310a (No. 46) has grooves parallel to the axis, inside the perforation at each end, and these give the impression that the perforation has been dug out. This is a soft steatite bead and these are probably only the marks left by wear from the string. Most of the " resin " beads had the same feature.

Though in later periods a great many amulets were purely funerary, there can be little doubt that in the Predynastic period the beads buried with the owner were those he wore in life. The various states of wear of the glazed beads are alone sufficient evidence for this.

INDIVIDUAL STRINGS.

The following are a few notes added to amplify the register and the above general remarks. Some strings are described in full by Mr. Beck and others on pp. 83–91.

1212 There are no marks of manufacture on the barrels in this string, which are of the same material and size as the bicones, themselves heavily scored, and this suggests that the barrels were " turned."

1370 A tomb of S.D. 46 containing six glazed carnelian beads and six of bituminous material, which alternated on the string. The bituminous beads had been worn by the string inside the perforations.

1400C The score marks caused by rubbing down the steatite bead were very noticeable.

1400D The barrel, which is very roughly shaped, is one of the few barrel beads which was certainly rubbed down and not turned. The different planes of abrasion are pronounced.

1424a The following order was ascertained : 1 sard, 3 carnelian, 1 agate, 2 carnelian, 1 agate, 3 carnelian, 1 amber, 6 steatite, 1 agate. After that it was not discernible.

b Several of the steatite beads were stained green and some green coating could be flaked off one or two of them. This appeared to be malachite and, since this mineral was found in the tomb, there can be little doubt that it caused the staining.

d These beads were found under the head and the string was probably a continuation of c.

1462 It is clear that the limestone beads were groove-ground. The fluorspar, though they may have been turned, could have been brought to bicone form by rubbing down. The flaking marks are plain on the fourth carnelian bead (No. 7), and it is doubtful if these were finished by turning. The string is in the original order in the register.

1534 The photomicrograph on Pl. XXXVII, Fig. 4 shows the base of the fly amulet, and in the V-mark between the wings can be seen the marks of rubbing down.

[1] *Beck*, p. 10 suggests that beads with alternate concave and convex ends were made to fit into each other. Mr Hart thinks this effect may have been produced by wear.

1547 The carnelian bead is one of the rare bicones that were almost certainly turned.

1554 The second bead has been turned, and, being asymmetric about its axis, has been smoothed on the profile farthest from the perforation, whereas on the other side the flaking marks are unsmoothed.

1567 The first glazed bead is of unusually good colour and, since it is a rough shape similar to that in which turquoise was often left, it is probably an imitation of this mineral. (The evidence that blue and green glazed beads were always intended to imitate turquoise, even at the date when these beads were first manufactured, is not strong.)

1572 The method of manufacturing the garnet beads is doubtful, but slight turning after flaking seems probable.

1580 The type example of glazed carnelian dated to S.D. 53–70.

1597 A very clear case of groove-grinding and turning on the same string. The discs have marks obviously caused by groove-grinding, while the barrels show no marks of manufacture at all. The bicone has plainly been rubbed down.

1310c The cores of the gold beads are very friable. They may be of the same composition as that suggested by Beck for 1310a4. The glass beads have been identified simply by comparison with that from 1310a.

d There is an unexplained groove on one side of the profile running parallel to the axis on No. 2. See Beck's report on 1310a No. 46 (p. 86).

1311 The order was as follows : Twenty discs followed by two amulets ($45P_{14}$ and P_{16}) and then further discs ; probably the amulets were spaced in pairs among the disc beads.

1322 *Brunton* $89Z_1$ (Pl. XLII) has been classed as *Beck* XXVIIIB1 on the assumption that it is a plumb-bob amulet.

1323 Bead No. 3 has the same groove along the side found in steatite beads of 1310a and d. This bead is also steatite.

1351 Groove along one side of the bead parallel to the axis as above. Also steatite.

1213A1 This string is in the original order. The colouring matter on the sixth amulet ($14D_2$) more resembles paint than glaze, but there is little remaining. It came from the neck.

1213A2 String in the original order. Right wrist.

1213A3 String in the original order. Left elbow.

4 " " " " " Left wrist.

5 " " " " " Hips.

6 " " " " " Hips.

7 " " " " " Right ankle.

8 " " " " " Left "

Conclusions.

The difficulty in drawing any satisfactory conclusions from the Predynastic and Proto-dynastic beads here described lies in the paucity of closely dated strings. Only fifteen strings are sufficiently closely dated to be of value for establishing the different customs at different periods, and of these no less than ten had six beads or less.

The sixteen graves dated before S.D. 42 had no beads at all, but these are only 10 per cent of

the total number of dated graves (164) and would be expected to contain no more than two or three of the total number of dated strings (25) so that chance might account for their absence.

An analysis by materials of the fifteen dated strings is given below and the figures are of some interest, though they must be regarded with due caution. Petrie (*Pre. Egypt*, p. 44) says: " Broadly, there is a gap in the production of beads from 40–50 (S.Ds.) in which time there was scarcely any work except in soft steatite and calcite. The second civilisation stopped the hard stone work of the first age, and did not revive it again until the luxurious age of 50–60." It appears from the rather unreliable guide of the above few specimens that the first age at Armant continued till 43–46 and the advent of the luxurious age was similarly delayed till 63–66 about.

The group of shell beads from 57–66 is interesting.

The same group of strings was analysed according to the shapes of the beads and the types of perforation. The only result was to show the advent of long cylinders (*Bad. Civ.* Type 75) at the end of the Predynastic period.

A table was also drawn out analysing the material according to the methods of manufacture and the quality of the perforation. This showed no change throughout the period.

Next, a shape was taken at random from *Beck*, I.B.1.b. (short barrel), and all the occurrences of this shape were tabulated with the material, type, details of perforation, and method of manufacture. A preponderance of turned beads resulted: fifty-three out of sixty-one (of which the method of manufacture could be hazarded), excluding moulded and modelled beads. (There were also thirty-six beads on the border line between I.B.1.b. and I.B.2.b. (short cylinders) which were groove-ground.) The perforation showed no uniformity. The same was attempted with a shape from *Bad. Civ.*, but there were insufficient beads of any one sub-type to give any interesting results.

Any such analyses to be of real value must cover the bulk of the dated material of the Predynastic period, and to obtain this most of the strings in museums would have to be worked over again and re-recorded.

Tomb	Date	Hard Stones					Soft Stones, etc.					Compositions	Natural Objects
		Agate, sard carnelian, glazed carnelian	Chalcedony	Crystal quartz	Garnet	Fluorspar	Steatite, Dull Serpentine	Clear Serpentine	Gypsum	Bituminous Material	Shell	Faience	Shells Teeth &c.
1427	34–42						4		5				
1413	32–43	1											
1411	42–44			1		1							4
1370	46	6								6			
1461	43–50										1	(2)*	
1596	41–51											3	
1448	45–57												4
1538	57–61						1				18		2
1485	60										3		
1534	63–66	15			1		1	22			18		1
1344	77	1											1
1591	68–78	1											
1312	79–80	8	1	2	1								
1207	80						1					24	
1208	80											2	1

* Intrusive.

O. H. M.

Three Strings of Beads from Armant.

By Horace C. Beck.

The three strings numbered AR 1310/a, 1310/b, and 1502 have been examined and a detailed list of the individual beads is attached. I did not think it necessary to measure or otherwise test all of the carnelian beads, but have selected a few.

Date.

It is difficult to state the date of these beads with any certainty, as most of the beads are of types which lasted for a considerable time, but I think that they are either Old Kingdom or Sixth Dynasty.

The black faience beads are usually put to the Sixth Dynasty as they are frequently found in sites of that period, but they are also found in Predynastic graves. The beads on the strings from Armant are decidedly smaller than usual.

The carnelian beads are many of them of a very fine colour and most of them resemble Old Kingdom beads.

Ivory or Bone.

There are a few beads (10/1310a, 2, 3, and 8/1502) which are made of an animal material, the sp.g. is from 2 to 2·25 which is rather too high for ivory, even hippopotamus ivory, but the difference may be due to some mineral having been absorbed by the beads when buried. The material is not rapidly affected by acids, it is not easily melted; when touched by a red-hot wire there was no appreciable mark made. These tests showed that it could not be a resin, also the sp.g. of most of the resins is not much above 1.

It seemed pretty certain that the material was either bone or ivory. To test this, a small piece was broken off. This was mounted and examined under the microscope; careful comparison showed that the structure was more closely allied to a piece of mammoth ivory than to a bone used for making a neolithic needle or pin in the Swiss lake dwellings, or to a piece of fossil bone used to make a bead in Mesopotamia. Further comparison and examination of modern ivory, mammoth ivory and hippopotamus ivory convinces me that the Armant beads are ivory, but I cannot say whether it is from an elephant or hippopotamus.

Beads 4 and 51/1310a may be made of the same material. They appear to be cores for metal beads, they are made of a white material and have had a black coating on them. They have very low sp.g., No. 51 has sp.g. 1·8. The black covering may be a bitumen compound to cement the gold or other metal covering.

In bead 19/1310b a core is still in position; this core looks rather more like bone than ivory.

Glass.

A bright blue cylinder bead (No. 44/1310a) proves to be a glass bead of the same type as the Seventh–Eighth Dynasty glass bead from Qau. The base of the glass is not absolutely isotropic, but this is probably due to strain. In both specimens there are an immense number of crystals of spinel, which are clearly seen in a section.

If this specimen is really Old Kingdom it would show that beads similar to those referred to in " Glass before 1500 B.C." (*Ancient Egypt and the East*, June, 1934) were being made as early

as the Old Kingdom. Bead No. 10 in that article closely resembles this bead, but the Qau bead is much more corroded.

Gold.

The gold beads are principally either very thin shells originally filled with some core or else thin caps, fitted on to a cylindrical stone or frit bead. One bead which was tested (No. 23 1310b) had a sp.g. of 14·7 showing that a fairly high quality gold was used.

Some of the gold beads had the ends overlapping and not soldered, others had the ends butted together, and also not soldered. The gold caps, however, appear to be soldered.

Copper.

There are a few beads made with strips bent round and with ends butted together. These look rather like a copper alloy. The sp.g. of three Nos. 5, 6, and 7/1310a is about 7·5. This shows that if there is any gold included it must be a very small amount. As, however, the surface is so free from corrosion it suggests that a small percentage of gold has been added.

Iron.

Two beads Nos. 1 and 2/1310b are apparently the cores of metallic beads. They had a very thick corrosion on them which flaked off very easily. It seemed probably that this was due either to copper or iron.

A ferrocyanide test for iron on a minute fragment of the corroded material showed that it contained a considerable amount of iron, but it may not have been pure iron, but an alloy of copper and iron.

The fact that these beads have now very little metal left on them is shown by their sp.g. which is about 2·5.

Fluorspar.

One bead, No. 12/1502, is made of fluorspar. This material is not very common, but is found on Predynastic necklaces, and a pendant of the same material has been found at Nineveh, but that is not accurately dated.

Felspar.

The material called felspar in this report is the green monocline variety. The same stone, but with a more blue colour is called amazon stone.

String No. 1310*a*. (The beads from this tomb are shown on Pl. XXXIX, Fig. 7.) (All beads are numbered from the label.)

No. 1. Black faience annular bead of unusually small size. Length ·03 in., diameter ·07 in., sp.g. between 2·37 and 2·45. These beads are made of a black faience in which the colouring matter is manganese. Such beads are found in great numbers in some of the Sixth Dynasty sites, but they are not usually as small as these. Similar beads are also found in Predynastic graves.

No. 2. Black faience cylindrical bead. Length ·07 in., diameter ·07 in. Except for a slight difference in shape this bead is similar to No. 1.

No. 3. Similar bead to No. 1.

No. 4. Short cylinder bead or annular bead with square cross section. Length ·07 in., diameter ·09 in., sp.g. approximately 2·7. This bead has apparently had black coating on it which resembles bitumen. It may have had a metal covering originally.

It may be a mixture of ivory or bone, and a cement, or it may have been carved to shape and then have had a metal foil cemented to it by a black cement.

Bead No. 51 on this string is a similar specimen, but it has a much lower sp.g.

Nos. 5, 6, and 7. These are short cylindrical beads made by bending up a strip of metal so that the ends are butted together but not soldered. Length ·03 in., diameter ·07 in. The three beads together weigh ·044 grammes, and their sp.g. is about 7·5.

It is improbable that there is much gold in their constitution, but their freedom from appreciable corrosion makes it look as though they had a little. (See Mr. D. M. Smith's report on p. 91. Ed.).

Nos. 8 and 9. Dark green turquoise short barrel beads. Length ·06 in., diameter ·12 in. The sp.g. is about 2·7 as they float in neat bromoform and just sink in a fluid of 2·7. This exactly agrees with a turquoise I tested them with. The hardness is 6, which agrees with turquoise. A small chip under the microscope shows very little bi-refringence which also agrees with turquoise, and is entirely different from felspar.

No. 10. Cylinder bead of ivory (?) See Nos. 2, 3, and 8/1502. Length ·17 in., diameter ·11 in. (Might this not be a bird's leg bone ? O.H.M.)

No. 11. Short barrel bead of turquoise. Length ·06 in., diameter ·09 in.

No. 12. Short barrel bead of turquoise. Length ·07 in., diameter ·09 in.

No. 13. Short barrel bead of turquoise. Length ·06 in., diameter ·12 in.

No. 14. Short barrel bead of green felspar. Length ·06 in., diameter ·13 in.

No. 15. Cylinder beads. Length ·09 in., diameter ·10 in. This bead is probably the same as the last, but it has a slightly higher sp.g.

No. 16. Cylinder beads. Length ·08 in., diameter ·10 in., material the same as last.

No. 17. Short barrel carnelian bead. Length ·10 in., diameter ·13 in.

No. 18. Short barrel carnelian bead. Length ·07 in., diameter ·19 in.

No. 19. Long barrel steatite bead. Length ·31 in., diameter ·16 in. Sp.g. about 2·5 hardness under 2.

No. 20. Carnelian barrel bead. Length ·18 in., diameter ·16 in., a typical early bead.

No. 21. Cylindrical bead of frit. Length ·17 in., diameter ·12 in. This bead has been discoloured on the surface; it was originally blue. This material is the frit that was reproduced by Laurie and called by him Egyptian Blue. It is a double silicate of copper and lime and when examined under the microscope is somewhat pleocroic. This material was used by the Egyptians for painting. Recently Miss Hodgson has made the material with an even brighter colour and used it for the same purpose.

No. 22. Carnelian barrel bead. Length ·26 in., diameter ·20 in.

No. 23. Short cylinder bead of green felspar. Length ·09 in., diameter ·17 in.

No. 24. Spheroidal carnelian bead. Length ·12 in., diameter ·15 in.

No. 25. Cylinder bead of frit. Length ·24 in., diameter ·14 in., see No. 21.

Nos. 26, 27 and 28 are carnelians.

No. 29. Frit cylinder bead. Length ·22 in., diameter ·13 in. See No. 21.

Nos. 30 and 31 are carnelians.

No. 32. Green felspar short cylinder bead. Length ·12 in., diameter ·18 in.

Nos. 33 and 34 are carnelians.

No. 35. Barrel bead of green felspar. Length ·29 in, diameter ·19 in.

No. 36. Carnelian.

No. 37. Carnelian barrel bead. Length ·35 in., diameter ·23 in. A typical early bead.

No. 38. Green felspar short cylinder bead. Length ·08 in, diameter ·19 in.

Nos. 39, 40 and 41 are carnelians.

No. 42. Green felspar short cylinder bead like No. 38.

No. 43. Steatite barrel bead. Length ·34 in., diameter ·15 in. Hardness about 2.

No. 44. Pale blue cylinder bead. Length ·30 in., diameter ·13. Sp.g. between 2·45 and 2·5, hardness about 5. It will just scratch apatite.

This important bead is a form of glass. It is under considerable strain which makes it polarise very faintly. It has great numbers of spinel crystals in the transparent base, and also a few pieces of very clear glass. The spinel crystals must have crystallised out. Dr. H. H. Thomas who has very kindly examined a section of this bead, considers that it is undoubtedly an artificial material, but it must have needed great heat to produce. The section shows great similarity to the section of bead No. 10 in the article, " Glass before 1500 B.C."

No. 45. Frit cylinder bead. Length ·24 in, diameter ·13 in., see No. 21.

No. 46. Steatite barrel with groove cut along it. Length ·24 in., diameter ·12 in., hardness under 2.

Nos. 47 and 48 are carnelians.

Nos. 49 and 50 are black faience beads similar to Nos. 1, 2, and 3.

No. 51. Cylindrical bead. Length ·07 in, diameter ·07 in. Weight ·007 grammes. Sp.g. 1·8 approx. This is probably the core of a gold-plated bead. It appears to be a white material cemented together with bitumen.

A number of thin, gold-plated beads from various countries are filled with a form of bitumen. This varies from almost pure asphalt to a sand which has been slightly infiltrated with bitumen.

No. 52. Green felspar cylindrical bead. Length ·07 in, diameter ·09 in.

No. 53 is carnelian.

No. 54. Cylindrical bead of glazed steatite. Length ·10 in., diameter ·08 in., hardness 5½.

No. 55. Short cylinder metal bead, similar to Nos. 5, 6, and 7. This bead is made by bending up a strip of metal and butting the ends. These ends are fitted very close together but in the specimens tested they were not soldered.

No. 56. Black faience bead similar to Nos. 1, 2, and 3. Length ·035 in., diameter ·075 in.

No. 57. Short cylinder bead of turquoise. Length ·07 in., diameter ·10 in.

No. 58. Bead of glazed steatite. Length ·06 in., diameter ·11 in.

No. 59. Rough bicone bead of serpentine. Length ·06 in., diameter ·13 in. Hardness under 4 and over 2.

Nos. 60 and 61. These are carnelians.

No. 62. (See Maufe, p. 89. Ed.)

String 1310*b*.

No. 1. Length ·03 in., diameter ·07 in., sp.g. 2·48.

No. 2. Length ·04 in., diameter ·07 in., sp.g. 2·5, approx. These two beads are made of a black material. The corrosion suggests that they had a metal coating, but if so it must have almost entirely gone, this is shown by their low sp.g.

The corrosion which has a reddish colour contains a considerable amount of iron but I do not know if it was all iron or a compound of iron and copper. A very small piece tested by the ferrocyanide test showed a bright blue solution.

No. 3. This bead is a core which originally had a metal covering. Length ·03 in., diameter ·07 in., sp.g. 2 approx. The metal has entirely disappeared leaving a whitish base.

No. 4. Length ·03 in., diameter ·07 in., perforation ·05 in. diameter. This bead is made by twisting round a strip of metal; the ends are butted together very closely. It resembles beads Nos. 5, 6 and 7, on string 1310a, and like them is probably made of an alloy with a very small proportion of gold.

No. 5. Frit barrel bead. Length ·24 in., diameter ·12 in. This appears to have been covered with a black substance, possibly for cementing the cover to the base. Many of the capped beads are black under the caps. This black may be bitumen but it is very difficult to remove with a solvent such as xylene.

Nos. 6 and 7. Thin gold or electrum covers on a light base. Lengths ·23–·29 in., diameters ·09–·11 in., sp.g. of No. 6 is 2·5. The metal which is very thin is folded over and not butted or soldered. No. 6 has traces of the original filling. Ivory (?)

No. 8. Cylinder bead of frit with gold caps. Length ·23 in., diameter ·13 in.

No. 9. Carnelian cylinder bead with gold caps. Length ·36 in., diameter ·15 in.

No. 10. Frit cylinder with gold caps. Length ·31 in., diameter ·12 in.

No. 11. Cylinder of frit with gold caps. Length ·34 in., diameter ·22 in.

No. 12. Elliptical cylindrical bead of frit. Length ·72 in., diameter, maximum ·22 in., minimum ·15 in. Discolouration showing that bead was capped at both ends remains.

Beads with elliptical cross sections are not common in Egypt, but are much more frequently found in Mesopotamia and India. Gold-capped beads have been found in considerable numbers at Ur.

No. 13. Gold cap belonging to a similar bead. Length ·16 in., diameter ·16 in.

No. 14. Cylindrical steatite bead which was originally capped with gold and which still has a portion of one of the caps remaining. Length ·73 in., diameter ·19 in., weight ·729 grammes, sp.g. 2·63, hardness approximately 2.

No. 15. Cylindrical bead of felspar with gold caps. Length ·41 in., diameter ·20 in., hardness 6.

No. 16. Cylindrical bead of frit with one gold cap. Length ·38 in., diameter ·11 in. (For beads 10–16 see Pl. XXXVI, Fig. 4.)

No. 17. Cylindrical bead of felspar with gold caps. Length ·26 in., diameter ·09 in.

No. 18. Cylindrical frit bead with gold caps. Length ·21 in., diameter ·12 in.

No. 19. Gold casing from a cylindrical bead. Length ·30 in., diameter ·09 in.

No. 20. Gold casing from a cylindrical bead. Length ·31 in., diameter ·12 in.

No. 21. Very thin gold casing from a barrel-shaped bead. Length ·37 in., diameter ·13 in.

The small piece of gold between Nos. 20 and 21 which at first appeared to be attached to the latter, is probably a small gold cap from another bead.

No. 22. Gold case from an oblate bead. Length ·08 in., diameter ·13 in.

No. 23. Bead of folded gold. Length ·06 in., diameter ·12 in. It has been made by folding round a strip of metal; the ends of the strip overlap and no attempt has been made to solder them. The bead has a weight of ·047 grammes and a sp.g. of 14·7 approx., which shows that a fairly high quality of gold has been used. 12 carat gold is about 14 sp.g.

String No. 1502.

No. 1. Bicone steatite bead. Length ·12 in., diameter ·25 in., weight ·157 grammes, sp.g. 2·75.

Nos. 2 and 3. Ivory cylindrical beads. Length ·22 in., diameter ·12 in., weight of the two beads together ·144 grammes, sp.g. 2·25. After the sand had been removed by boiling, the weight of No. 2 became ·048 grammes, and the sp.g. 2·09.

Microscopic examination shows that the material is not mineral as there are the remains of definite cell structure. It is probably ivory. Elephant ivory has sp.g. 1·73 to 1·8, whilst hippo ivory goes as high as 1·87. The slightly higher sp.g. of these beads may be due to minerals that they have absorbed since burial.

No. 4. Oblate alabaster bead. Length ·14 in., diameter ·27 in., weight ·218 grammes, sp.g. 2·49. This is the true alabaster or gypsum and is not calcite, the mineral so largely used in Egypt, where it is called alabaster.

No. 5. Steatite bicone bead. Length ·15 in., diameter ·29 in., weight ·305 grammes, sp.g. 2·79.

No. 6. Short cylindrical carnelian bead. Length ·10 in., diameter ·24 in.

No. 7. Steatite bicone bead. Length ·14 in., diameter ·26 in.

No. 8. Ivory cylindrical bead. Length ·21 in., diameter ·13 in., sp.g. 1·8, hardness much under 3, under 2 (?).

No. 9. Oblate alabaster gypsum bead. Length ·13 in., diameter ·24 in., very large perforation.

No. 10. Bicone steatite bead, wedge shaped. Length ·19 to ·15 in., diameter ·29 in.

No. 11. Short barrel carnelian bead. Length ·12 in., diameter ·29 in. Hour-glass perforation.

No. 12. Bicone bead of fluorspar. Length ·12 in., diameter ·23 in., weight ·167 grammes, sp.g. 3·13. Beads of fluorite have been found in Egypt and Mesopotamia, but they are not common.

No. 13. Ivory bead. Length ·16 in., diameter ·10 in., sp.g. 2·16. This material was only slightly affected by hydrochloric acid.

No. 14. Oblate steatite bead. Length ·09 in., diameter ·26 in.

1207. Various shapes. These are a very good colour and rather unusual shape for Predynastic faience. If I had not known that they were Predynastic, I should have thought they were Sixth Dynasty. The glaze of some of the Hierakonpolis beads (Dynasty O) is also similar to these.

1211. Various shapes. These glazed steatite beads are very typical of the type found in the Predynastic period. They commenced in the Badarian period and were continued to at least the First Intermediate.

1300. A glazed quartz annular bead (86s9) of very good colour. The coloured layer flakes off very easily, leaving a highly polished surface. This is not quite the usual Egyptian type.

1312 (b). (86T12 and 89C10.) These beads are made in the same manner as many of the Mesopotamian glazed quartz beads. Beads of this sort are very rare in Egypt and may have been imported.

A bead from 1580. (The optical characters of this bead are described by Mr. Maufe on p. 91. and an analysis of it by Dr. Cox is given on p. 93.)

" In my opinion this is definitely a carnelian, which, after being shaped, has been heavily patinated. (See Part III, of ' Glazed Stones,' *Ancient Egypt*, 1935, Part I.)

" I cannot say for certain how it has been done in this case, but, if there is other evidence of cremation, I should expect that to be the cause. An effect of this sort can be obtained by ordinary heating, but, to produce such extensive patination, I think that some alkali must have been used." (Cremation is not possible since the bead was found with a number of unaltered ostrich shell beads, nor was there any sign of this in any of the other burials in which these beads were found. Moreover, in some of them there were remains of a brilliant green colouring matter, which had for the greater part rubbed off. This surely shows conclusively that the process was an intentional one. O.H.M.)

H. C. B.

Some Beads from Armant.

By Mr. H. B. Maufe.

1310d. (Fourth or Twelfth Dynasty.) Rt. Hand. 3 beads.
Mottled green cylinder. (75 B 24) Powder has refractive index < 1·530; low bi-refringence; characteristic cross-hatched twinning of microcline. Smaller grains show albite twinning or none at all, but refractive index is always below 1·530.
Amazon stone (*microcline felspar*).
Brown barrel mottled by dark red. (78 H 26) Soft. Powder has refractive index near 1·573. Very low bi-refringence. Very pale brown with dusty opaque inclusions.
Serpentine.

1310a. (Fourth or Twelfth Dynasty.) Neck. Bead 62.
Pale grey cylinder. (75 J 24) Glazed surface harder than steel, interior softer. Powder is a felt of scales with refractive index < 1·573 and > 1·590. Very low bi-refringence, not pleochroic. *Probably glazed serpentine.*

1323. (Fourth–Fifth Dynasties.) Bead 23.
Barrel. (78 H 21) Very soft. Fragments under the microscope are colourless and formed of a microcrystalline mass of scales; refractive index 1·573 or generally less. High bi-refringence and straight extinction. *Steatite.*

1357. (Pre., S.D. 44–64.)
Pebble, unpierced. Bead 11. (Bead 3 (89 D 4) is the same.) White with rusty brown stains. Specific gravity 2·26; just scratches window glass. Powder has refractive index just below 1·520 and well above 1·500; low bi-refringence; straight extinction;

fibrous, crystalline texture with the faster ray parellel to the elongation (i.e. the principal zone is optically negative). *Possibly wood opal.*
The material appears to have been opaline silica that is now chalcedonic. A test for high percentage of silica is desirable.
(Silica content :—44·0 per cent, see p. 93. Ed.)

1411. (Pre., S.D. 42–44.) Bead 6.
Yellow bead. (86 C 12) Oblate. (Transparent.) Described with next specimen.

1462. (Pre., S.D. Unknown.) Bead 2.
Green disc bead. (86 T 16) (Transparent.)
Specific gravity 3·18. Scratched by steel, but scratches a bronze coin. The powders are clear, colourless and isotropic with refractive index much below 1·470. Fracture splintery to conchoidal. Cleavage with angles of 60 degrees seen occasionally.
Fluorspar.
Under the ultra-violet rays the green bead fluoresces the characteristic purple colour, whilst the yellow bead gives a brown which is yielded by some fluorspar.

1419. (Pre., S.D. 44–61.) Sample bead from string all the same.
White cylinder with traces of green. (75 C 6.)
Fragments of a pinkish brown bead with a flaky white crust. The brown portions have a hardness nearly as great as steel.

Like the glazed steatite bead of 1211 (see Beck's report) this bead consists of a broad central zone of yellow-brown material and inner and outer narrow zones of bluish colour which have a high refractive index but very low bi-refringence, and are doubtless the glaze.

The mineral of the central zone has a rather fibrous texture, and is slightly pleochroic, the deeper tint showing when the fibres are parallel to the direction of polarisation. Refractive index $> 1\cdot590$ and $< 1\cdot633$; the bi-refringence is high, extinction straight and the slower ray is parallel to the fibres (i.e. principal zone optically positive). The characters are thus very similar to those of the natural mineral anthophyllite, a magnesium silicate containing less silica than steatite. In the fragments examined the fibres always trend transversely to the central zone, as if regularly radially disposed about the axis of the bead, suggesting that the texture may be secondary and perhaps induced during the glazing process.

Altered steatite (glazed)?

1482. (Pre., S.D. unknown.) Beads 47 and 48.
Semi-translucent brown discs. (86 P 6.)
Very soft. The material of both beads consists of rusty brown scales with refractive index above, at, and below 1·573. High bi-refringence and straight extinction.
Steatite.

1534. (Pre., S.D. 63–66.) Bead 9.
Transparent pale green disc mottled with dark green. (86 P 12.) Colourless to very pale brown fragments with refractive index a little above 1·560. Minute, ragged, lath-shaped crystals with criss-cross texture, very low bi-refringence and straight extinction.
Serpentine.

1566. (Pre., S.D. 42–59.) Bead 1.
Cylinder of greenish-grey colour with hair-line reddish-brown veinlets. (75 A 18.)
There is a hard, whitish, nearly continuous, inner layer. Powder under the microscope shows fragments of two kinds :—(1) brownish and similar to the brown material of the glazed steatite bead from 1211. Refractive index generally just above 1·573. A felt of scales with straight extinction, fairly high bi-refringence and optically positive principal zone. These grains are white to the naked eye and are apparently altered steatite ; (2) grains from the greenish-grey parts are so deeply stained a dark brown as to be nearly opaque.
Altered steatite? (glazed).

1597. (Pre., S.D. unknown.) Beads 36 and 48.
Dark grey disc. (86 P 10.) Very soft. Powder is a colourless, finely crystalline scaly mass dusted through by opaque black grains, probably magnetite. The scales have a refractive index $> 1\cdot560$ and $> 1\cdot590$, high bi-refringence and straight extinction.
Steatite.

Brownish disc. (86 K 22.) Very soft. Powder is a pale rusty brown, finely crystalline scaly mass with refractive index near 1·573 (generally less), high bi-refringence and straight extinction.
Steatite.

1580. (Pre., S.D. 53–70.)
Short barrel, white with traces of green. (86 M 12.) Bead with pink interior and grey coat with traces of green glaze. Just scratches window glass. Specific gravity 2·54. Refractive index between 1·530 and 1·520. Colourless to pale brown with deeper mottlings of limonite brown and " mossy " inclusions apparently of limonite. Wholly crystalline with low bi-refringence. Bunches of radiating fibres (giving the appearance of interfering spherulites) with slower ray parallel to long axes (principal zone optically positive).
Glazed carnelian.

(See Dr. Cox's analysis on p. 93 and Mr. Beck's report on p. 89.)

H. B. M.

Spectrographic Examination of Egyptian Bead Strip. (1310 a 6.)

By Mr. D. M. Smith.

(*of the British Non-Ferrous Metals Research Association.*)

The small strip sample was cut in half (with a clean razor blade) and one part was analysed spectrographically by means of the arc (taking 4 amps.) between Acheson Graphite rods ($\frac{1}{4}$-inch diam.) of high purity. The upper electrode was shaped to a point and the specimen was placed in a shallow cavity in the lower electrode.

The principal constituent was *Silver* and the principal impurities or alloying constituents were *Gold* and *Copper*. Other impurities detected, in approximate decreasing order of importance, were : Silicon, Calcium, Magnesium, Iron, Lead and traces of Bismuth and Tin.

Beetle Remains from 1466, and Beads from 1502 and 1566.

By Dr. K. G. Blair.

The specimen from Ar. 1466[1] is *Ocnera hispida* Forsk. (Tenebrionidae), normally a coal-black insect, but the colour has been lost with age. Dead specimens lying on the surface bleach to a whitish colour in the sunshine. The species is now a common one in Egypt.

The thoraxes from Ar. 1502 are of *Steraspis squamosa* Klug. This beetle belongs to the Buprestidae, a family in which many species exhibit striking metallic colours, and are, even now, used as jewellery in various parts of the world. Living or fresh specimens of *S. squamosa* are normally green, with golden or bluish reflections, but these colours appear to have been changed by time to the dull purplish-blue now seen. The texture in both cases has become somewhat weakened, the ventral parts separating from the dorsal; the fresh thorax would be firm and compact, the ventral parts firmly united to the upper, and would form a fairly satisfactory bead, which cannot be said of them in their present condition. There is in the Natural History Museum a beetle taken from a mummy of an Ibis said to be some three thousand five hundred years old; this also belongs to a modern species in that country.

The string of beads from Ar. 1566 consists, in part, of the femora of beetles, and they seem to agree very well with those of *Steraspis squamosa* Klug, species from Ar. 1502. They appear to have retained their colour rather better than the thoraxes, and to be not quite so fragile, but with the clue given by the former specimens, I think their identity is fairly certain.

A Seed used as a Bead in 1554.

By Mr. L. A. Boodle.

It has not been found possible to identify this specimen, though Dr. Sprague of the Kew Herbarium, Mr. Howes of the staff of the Kew Museums, and myself have all tried. There is just a possibility that it is a gall from some plant instead of a fruit (" seed pod ").

There is no reason for supposing the specimen to belong to an extinct or unknown plant. Failure to identify it is probably due to the specimen being incomplete; the internal parts as well as the parts representing the region of the attachment and the apical region being missing. The part that remains has nothing distinctive about its microscopic structure, and therefore does not give any definite clue.

The size, shape and external appearance might provide a clue, if one had previously examined closely the same part of the same species, otherwise an inordinate amount of time might be spent on the specimen, and quite likely without success.

Fragments of Coral used as Beads in 1502.

By Mr. A. K. Totton.

The specimens submitted are fragments of the Red Organ-Pipe coral *Tubipora musica.*

[1] Only an accidental occurrence in tomb. Probably came in on the matting. Ed.

Analyses of Three Beads.

By Dr. H. E. Cox.

Ar. 1357 Unpierced pebble. It contains :

Loss on ignition (mainly water of hydration)	14·0 per cent.
Silica	44·0 ,, ,,
Phosphoric acid (P_2O_5)	Absent.
Alumina	27·7 per cent.
Iron oxide	Trace.
Calcium oxide	11·3 per cent.

I think these figures indicate that it is Wood Opal, if it be taken that the silica is of opaline origin and the alumina and lime derived from the mineral constituents of the wood.

Ar. 1580. Short barrel bead (86 M 12).

Loss on ignition (mainly combined water)	4·3 per cent.
Silica	95·0 ,, ,,
Alumina	3·0 ,, ,,
Calcium oxide	Minute trace

These figures add to rather more than 100 per cent, probably by reason of experimental error, as the amount available was so small.

Ar. 1200A. The material is practically insoluble in acid and does not effervesce. It contains :

Loss on Ignition (combined water)	3·9 per cent.
Silica	84·4 ,, ,,
Aluminium Oxide	4·9 ,, ,,
Iron Oxide	2·9 ,, ,,
Calcium Oxide	Trace.
Magnesium Oxide	Trace.

There does not appear to be a sufficient proportion of bases for a frit, according to the records of ancient Egyptian materials (Lucas, *Anc. Eg. Mat. & Ind.*, p. 432); also, there is no copper, lead, or other heavy metal.

A Substance from Dead-hole Perforation in third bead of 1597. (86C16.)

By J. F. Kirkaldy, M.Sc.

The material was removed with a sharpened match, in order not to scratch the steatite bead, and was mounted on a slide.

The grains are neither pure silica (sand) nor corundum, but are mostly of a crypto-crystalline variety of silica, probably a crushed chert or flint.

The grains under crossed nicols were clearly minutely crystalline as in flint or chert and were not abraded pieces of a large quartz crystal, as would have been the case, if they were normal sand grains.

There are one or two fibrous grains of sillimanite and kyanite, minerals derived from metamorphic rocks. These are fresh and unabraded and are obviously not part of the abrasive. One large rounded colourless grain I have not been able to identify.

J. F. K.

Beads from 1478.

By Mr. T. H. Withers.

The fossils from Ar. 1478 are fossil Annelids (Worms) of which the name is *Rotularia* sp. Similar forms occur in the Upper Pliocene of Wadi es Sheikh, 100 miles south of Cairo.

A Bead from 1424a.

By Dr. A. F. Hallimond.

The small dark garnet-red fragments from Ar. 1424a are certainly a resin. The material is extremely brittle. I do not see the network of cracks usually found on the surface of old amber; this may, however, be due to the loss of the surface layer, only the inner core being left. When heated it carbonises, giving a rather pungent smell which resembles that of succinic acid.

The material is much decayed, but I think it has been a variety of amber. It is hardly possible to hazard a guess as to its origin. (See Prof. Doran's report, p. 96 ff. Ed.).

Some Beads from Armant.

By Mr. F. A. Bannister.

The clear, dark-blue bead from Ar. 1213D (86 1 30) is undoubtedly glass. The specific gravity is 2·75 ± 0·02 and the refractive index 1·55 ± 0·005. It is isotropic and there are a few enclosed spherical bubbles. Probably calcium sodium silicate glass coloured by a trace of cobalt salt.

The bead was etched cautiously with a dilute HF. A drop of NaS solution was added and a white precipitate formed showing that lead is absent from the glass.

The transparent pink bead from Ar. 1200A (82 f 34) is also certainly glass. The specific gravity is 2·66 ± 0·02, and the refractive index about 1·54 ± ·005. It is isotropic and there is at least one spherical bubble enclosed. Probably a calcium sodium silicate glass.

The pale blue ring beads from Ar. 1309 (86 m 22) are not glass. (These must be faience; glass was considered a possible alternative on account of the homogeneous nature of the material which must have been due to mixing a large quantity of the glaze with the body material. O.H.M.) The specific gravity was 2·45 ± ·02.

The two blue beads, Qau. 7525, have variable specific gravities owing to included air bubbles, but the refractive indices are the same; the true specific gravity figure is about 2·48 ± ·02, refractive index 1·515 ± ·005.

The three red beads, Ar. 1200A (82 f 34), all have exactly the same specific gravity, namely

2·60 ± ·02, and there is no reason to suspect variation in refractive index. I have had great difficulty in securing the latter measurement since these beads are small and well-rounded with no sharp edges which might readily yield a small splinter. Finally I was forced to break one in order to get a measurement, n 1·525 ± ·005.

The blue beads are undoubtedly a potassium (or sodium), calcium silicate glass. The red beads, however, plot just on the edge of the lead field. I am not fully convinced that the red beads are really a lead glass.

Arab.

(1.) Short barrel 3 mm. × 2 mm., white with two Rose madder and two Emerald oxide of chromium stripes equally spaced parallel to the axis. (From a group said to come from Akhmim, containing two scent bottles in a linen bag, two necklaces, and a number of bangles decorated with silver and coral beads, the whole dated by the beads by Mr. Beck to A.D. 900–1000 about.) Lead glass bead, density 3·33, gives lead reaction when touched with HF and NaS.

(2.) Roughly faceted bead of irregular shape, about 1 c.m. × 1 cm. Mars brown (an imitation amber, from a group of four strings of beads said to come from Assiut, probably 14th to 18th cent. A.D.). A calcium glass of sp.g. 2·54 ± ·02 and refractive index 1·53 ± ·005.

(3.) Long barrel 1 cm. × 0·6 cm. White opaque. (From Palestine, 18th to 19th cent. A.D.) A calcium glass containing large numbers of air bubbles and quartz fragments. The density is 2·27, but this is, of course, of the bead and not of the glass and cannot be used for plotting. The refractive index of the glass itself, 1·52 ± ·005, is normal for calcium.

Only the amber bead gives a reliable plot, in the region of the blue and red beads (Ar. 1213G and 1200A) but a little higher up. Many modern calcium glasses plot near both positions.

Of the two other beads received for identification the elongated drop-shaped one of the Eighteenth Dynasty is a bubbly calcium glass d 2·50, n 1·52.

The other round imitation lapis lazuli bead of the Twelfth Dynasty (S.63.S., *Cemeteries of Abydos* II, 42) is extremely interesting. The surface is undoubtedly a glass, probably calcium glass; and is fairly hard so that it is quite impossible to detach a fragment for refractive index work. I suspect that the interior of the bead is not glass but rather faience and that the surface has been fired.

I am led to this conclusion by previous work of mine on an Egypto-Roman bead of identical colour and appearance. It has a density of 2·3 which approaches the figure for your round bead, namely 2·10; both figures are too low for ordinary glasses of the period. The thin glass surface is definitely a calcium glass. Hence my conclusion as to the composition of your own round bead which can be proved or disproved only by slicing it.

A Glass Bead.

By Dr. S. R. Nockolds.

Glass Bead (7090). Qau 612. *Ancient Egypt*, 1934, p. 14, No. 11. Specific gravity 2·339 at 15·5°C. Sp.g. of the glass 2·65. Refractive index 1·527 ± ·003.

Some difficulty was experienced in obtaining this as the glass is partly devitrified. The refractive index was determined on fragments of glass and not on devitrification products.

I am afraid it would be impossible to obtain the specific gravity of the glass directly unless the bead were crushed and even then the products of devitrification would interfere with an accurate result. The bead is literally full of air bubbles and this is, of course, why the bead would have to be crushed. There can be little doubt that the specific gravity of the glass is somewhere between 2·5 and 2·8 and the only thing that can be given is a rough approximation by estimating the volume occupied by the air bubbles. These must form at least 15 per cent. by volume and this would bring the specific gravity up to 2·75. Against this, there has to be set the partial devitrification which will tend to raise the specific gravity. If we make a slight allowance for this, then the specific gravity of the glass itself would be in the neighbourhood of 2·65.

S. R. N.

On Predynastic Resin Beads from Ar. 1370, 1403 and 1424a

(with some observations on the chemical investigation of small specimens of ancient amber).

By W. Doran, M.Sc., A.I.C.

(Department of Organic Chemistry, University of Liverpool).

Introduction.

The small size of the specimens (the largest of which weighed only 115 milligrammes) ruled out the possibility of determining such quantitative data as Acid Number, Saponification Number, etc., upon which the evaluation of resinous materials in commercial and technical practice is based. It was anticipated, however, that useful information would be gained by careful observation of the action of heat and by determination of the percentage of ash or residue after ignition.

Of published work, on the chemical investigation of amber, two papers in particular suggested further lines of attack suited to the present case, that of Coffignier (*Bull. soc. chim.*, 1909, V. 1101), giving data of solubility in boiling organic solvents, and that of Reutter (*Compt. rend.*, 1916, 162, 421), by whose method the resin, after treatment with ether and alcohol, is submitted to the action of hot alkali and by acidification of the alkaline extract succinic acid, if present, is isolated—the ether-alcohol soluble portion being treated with fuming nitric acid to attain a similar result.

Accordingly, the percentage of ash and the solubilities in boiling ether followed by boiling alcohol were determined by micro-methods on each specimen, and the material after solvent extraction was examined by a modification of Reutter's scheme. In addition, careful observation was made of the behaviour of the original substances on heating in a glass tube closed at one end—the appearance and odours of the volatile products being compared with those developed under exactly similar conditions from the allied resinous bodies, bdellium, frankincense, galbanum and myrrh.[1]

[1] Samples of these products were generously supplied by T. E. Lescher, Esq., O.B.E., of Messrs. Evans, Sons, Lescher & Webb, Ltd., Liverpool.

To provide a standard for comparison, all these qualitative and quantitative tests were also carried out upon a specimen of mediæval (Arab) resin bead reputed to be genuine amber.

In no case could succinic acid be isolated in a pure state, but the presence of traces of the acid was indicated in all but one specimen. (Amber is variously reported in the literature as containing as much as 80 per cent or as little as 1 per cent of succinic acid; some specimens have been stated to contain none.)

It was found during the present investigation that the green colour given by ether-alcohol extracts on mixing with fuming nitric acid (compare Reutter, *loc. cit.*) was not a satisfactory diagnostic character, but by the action of sodium carbonate solution on the ethereal solution of the resin after treatment with nitric acid a blood-red colour was observed which appears to be characteristic of amber.

Modification of Reutter's procedure adopted in this work.

(i) A weighed amount of the powdered resin was exhaustively extracted with boiling ether, the insoluble residue dried and weighed, and the percentage of ether-soluble matter calculated.

(ii) The insoluble residue from (i) was exhaustively extracted with boiling alcohol, the residual insoluble dried and weighed, and the percentage of alcohol-soluble matter calculated.

(iii) The combined ether and alcohol-soluble portions from (i) and (ii) were evaporated to dryness and the residue taken up again in pure dry ether. This ethereal solution was carefully mixed with half its volume of fuming nitric acid (added drop by drop) and allowed to stand. [Any crystalline deposit at this stage should be examined for the presence of succinic acid.]

(iv) After twelve hours the liquid from (iii) was mixed with an equal volume of distilled water and allowed to separate into two layers. The aqueous layer was evaporated to dryness and the melting-point of the crystalline residue (if any) determined. The ethereal layer was extracted with aqueous sodium carbonate and the extract acidified with dilute hydrochloric acid.

(v) The ether-alcohol insoluble matter from (ii) was boiled under reflux for two hours with 20 per cent aqueous caustic potash, from time to time detaching the condenser and noting any odour developed in the vapours (liberation of the terpene-body borneol is stated to be characteristic of natural amber.)

(vi) The cooled liquor from (v) was filtered, the filtrate acidified with dilute sulphuric acid and allowed to stand. Succinic acid should be deposited here, unless present only in very small amount. Since no crystals were obtained from any of the present specimens, barium chloride solution was added drop by drop until all the sulphate radical was precipitated. The clear filtrate from the barium sulphate was evaporated, carefully dried, and extracted successively with small portions of dry ether. After evaporation of the ether, the trace of residue was tested with mercurous nitrate solution and examined under the microscope for crystals of mercurous succinate.

Experimental Results.

Specimen Ar. 1370.

Weight 83·5 milligrammes. Fragments suggested originally shaped cylindrical bead (pierced axially), dense, opaque, black, brittle. Easily reduced to very dark brown powder.

Behaviour on heating. Did not melt. Vapours evolved with odour reminiscent of heavy petroleum. No visible condensate.

Residue after ignition. 23·61 per cent. Greyish-white, alkaline to litmus. Contained sodium, calcium, carbonate and trace of sulphate.

Solubilities. Boiling ether dissolved 4·87 per cent, after which boiling alcohol dissolved 14·53 per cent.

Modified Reutter test. (iii) Green colour with fuming nitric acid. (iv) No crystalline residue from aqueous layer. Ethereal layer with aqueous sodium carbonate gave brown colour No characteristic odour with hot potash solution. (vi) No reaction for succinic acid.

Specimen Ar. 1403.

Weight 115 milligrammes. Fragments varying in tint from pale golden through dark brown to black. Consistency vitreous, in parts semi-translucent. Easily ground to powder which had the colour of litharge. (One particle, size 30 cu. mm., black with white patch, was very hard and had the characters of rock ; it was kept apart from the powder used for the quantitative work.)

Behaviour on heating. Did not melt, but darkened gradually. Vapours highly aromatic, condensing to brown oily drops.

Residue after Ignition. 32·64 per cent. Dark grey, strongly alkaline to litmus. Contained calcium, iron, carbonate and faint traces of sulphate.

Solubilities. Boiling ether dissolved 3·71 per cent, after which boiling alcohol dissolved 4·35 per cent.

Modified Reutter test. (iii) Green colour with fuming nitric acid. (iv) Aqueous layer on evaporation left white crystalline residue, melting-point 162° (with decomposition). Ethereal layer shaken with sodium carbonate solution gave blood-red colour which was discharged on acidification with dilute hydrochloric acid. (v) Faint odour of borneol on heating with potash solution. (vi) Faint positive reaction for succinic acid.

Specimen Ar. 1424 a.

Weight 56 milligrammes. The main mass suggested a shaped bead. Inner part very deep red, translucent, brittle, breaking with conchoidal fracture. Outer " skin " 0·5 mm. thickness lighter in colour (reddish-brown). Easily pulverised.

Behaviour on heating. Did not melt, but darkened. Vapours evolved with incense-like odour, oily matter condensed.

Residue after ignition. 4·09 per cent. Light grey, strongly alkaline to litmus.

Solubilities. Boiling ether dissolved 0·64 per cent, after which boiling alcohol dissolved 40·38 per cent.

Modified Reutter test. (iii) Green colour with fuming nitric acid. (iv) White crystalline residue, melting-point 160° (decomposition) from aqueous layer. Ethereal layer with sodium carbonate solution gave blood-red colour, discharged by hydrochloric acid. (v) Odour of borneol in vapours from hot potash. (vi) Faint positive reaction for succinic acid.

Specimen Mediæval Arab Bead.

Weight 300 milligrammes. Dark orange colour, fully translucent. Tough to crush. Centre

of bead very pale yellow colour (almost water-white), yellowness increasing from centre until deep orange colour at periphery, pale centre portion toughest to crush, and tougher, i.e. less brittle, than any of the preceding specimens, whole ground up to pale orange-yellow powder.[1]

Behaviour on heating. Darkened and melted, white fumes evolved condensing to brown oily liquid with aromatic odour (more terpene-like than incense).

Residue after ignition. 0·26 per cent. Amount too small for further examination.

Solubilities. Boiling ether dissolved 3·75 per cent, after which boiling alcohol dissolved 29·87 per cent.

Modified Reutter test. (iii) Green colour with fuming nitric acid. (iv) Aqueous layer gave white crystalline residue, melting-point 154° (decomposition). Ethereal layer with sodium carbonate solution gave blood-red colour, discharged by hydrochloric acid. (v) Odour of borneol from vapours with hot potash solution. (vi) Positive reaction for succinic acid.

Comparison of Solubility data from all the Specimens.

If natural amber is correctly designated as the fossil resinous exudate from *Pinites succinifer* or similar species (compare *Allen's Commercial Organic Analysis*, 1925, Vol. IV, p. 237), then presumably no specimen should leave more than about 1 or 2 per cent of residue after ignition. Much higher ash-content than this indicates mechanical admixture with rock, sand, soil or other particles of a mineral nature and such contamination may have been either accidental or intentional.

Of the specimens herein reported upon only one, the " Arab " bead, conforms to the published figures for ash of genuine amber, although Ar. 1424a comes fairly close to it. The others were so heavily loaded with mineral matter that it seemed advisable to correct the solubility figures on all specimens by allowing for the ash and calculating solubilities on organic matter only. The figures recalculated in this manner are set out in the following table :

Specimen	% Ash	Solubility calculated on resin only	
		% in ether	% in alcohol
Ar. 1370	23·61	6·44	19·31
Ar. 1403	32·64	4·74	21·62
Ar. 1424a	4·09	0·67	42·13
Arab	0·26	3·73	29·96

The solubilities quoted by Coffignier (*loc. cit.*) for natural amber—age not stated—are :—in ether, 18·8 per cent : in alcohol, 14·3 per cent. It may reasonably be assumed that the greater degree of oxidation and polymerisation undergone by the constituents of the ancient specimens has lowered the solubility in ether and raised the alcohol-solubility.

[1] This suggests that when made from new amber, the bead may have been almost colourless and of a soft or semi-plastic consistency. Oxidation and other changes during the course of centuries would proceed from without inwards, and the resin of the outer parts would " mature " before that at the centre of the bead.

Final Conclusions

The evidence, as far as it goes, supports the assumption that specimens Ar. 1403 and Ar. 1424a are natural amber similar to the material of the Arab bead. They show differences from the characteristics ordinarily assigned to amber, but these differences are of the same order and of a kind which is consistent with age-long maturing of the resin.

Specimen Ar. 1370 is apparently not amber, but a bituminous material of the nature of asphalt or possibly a kind of ozokerite (" earth-wax ").

The diagnostic features relied upon in this micro-chemical investigation were :—appearance, consistency, behaviour on heating (alone, and with aqueous potash), solubilities in ether and in alcohol, colour reactions, presence of traces of succinic acid. No other resinous body than amber could be expected to respond to each and all of these tests.

The writer wishes to express his thanks to Mr. R. Rottensteiner for valuable assistance in the quantitative experiments.

W. D.

BEAD REGISTER: PREDYNASTIC

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[B]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour (See Pl. I.)	Notes
1211	3	I B 2 b	86 M 8	I	R.g.	S.	S.	?	Carnelian	1 Mars Orange and 2 Burnt Sienna (P.W.)	T.
,,	1	I B 1 b or f	86 L 12	,,	,,	,,	,,	Turned ?	,,	Mars Orange ,,	,,
,,	2	I B 1 b	86 F 24	,,	,,	,,	,,	,, ?	,,	,, ,, ,,	,,
,,	3	I C 2 b	86 K 30	IV	?	Gl.	Gl.	,, ?	Steatite	2 Transpt. Oxide of Chrome & 1 Veridian (P.W.)	,,
,,	1	I C 1 b	86 C 24(△)	,,	,,	,,	,,	,,	,,	Cobalt Green ,,	,,
,,	1	I B 1 f	86 C 22	I	Rd.	,,	,,	Rubbed down	,,	Veridian ,,	,,
,,	2	I B 1 b	,,	IV	?	,,	,,	,,	,,	,, ,,	,,
,,	2	I C 2 b	86 R 14	,,	,,	,,	,,	,, ?	,,	,, ,,	,,
,,	1	I D 1 b	78 B 28(△)	,,	,,	,,	,,	?	,,	Emerald Oxide of Chrom (P.W.)	,,
,,	2	I D 2 b	75 C 9	,,	,,	,,	,,	Rubbed down	,,	Veridian ,,	,,
,,	1	,,	75 A 12	II	Rd.	,,	,,	,, ?	,,	,, ,,	,,
1212	3	I B 1 b	86 M 12	I	,,	D.	—	?	Shell	Ultra Ash (2) Grey	,,
,,	1	,,	86 C 18	,,	,,	S.	S.	Rubbed down and turned	Steatite	New Olive Green	,,
,,	2	I B 2 b	86 L 12	,,	,,	,,	R.	?	,,	Burnt Umber ,,	,,
,,	1	I A 2 f	86 T 20	,,	R.g.	R.	D.	Rubbed down	,,	Black	,,
,,	6	I B 2 b	86 M 8	,,	Rd.	D.	R.	Groove-ground	,,	,,	,,
,,	1	I A 1 c	,,	,,	,,	R.	,,	Rubbed down	,,	,,	,,
,,	1	,,	,,	III	,,	,,	,,	,,	,,	,,	,,
,,	3	I B 4 db	86 V 8(△)	,,	,,	D.	D.	,, and turned ?	,,	,,	,,
,,	1	,,	,,	,,	,,	R.	R.	Rubbed down	,,	,,	,,
,,	1	,,	86 V 10 (△)	,,	,,	,,	,,	,,	,,	,,	,,
,,	1	I A 1 a	86 F 20	IV	D.g.?	D.	D.	Turned ?	,,	,,	,,
,,	1	I B 2 b	86 L 11 (△)	I	R.g.?	R.	—	Groove-ground	,,	,,	,,
,,	1	I B 6 gh	86 F 20	III	,,	D.	D.	Turned ?	,,	,,	,,
,,	1	I B 6 g	,,	,,	,,	,,	,,	,,	,,	,,	,,
,,	1	I B 7 gd	,,	I	,,	,,	S.(g) and D.(d)	,,	,,	,,	,,
,,	3	,,	,,	III	,,	,,	,,	,,	,,	,,	,,
,,	2	,,	86 F 18	,,	,,	,,	,,	,,	,,	,,	,,
,,	3	I B 6 gb	86 V 8(△)	,,	,,	,,	D.(g) and S.(b)	,,	,,	,,	,,
,,	2	,,	,,	I	,,	,,	,,	,,	,,	,,	,,
,,	2	I C 6 gb	86 V 7 (△)	IV	D.g.	,,	,,	,,	,,	,,	,,
,,	5	I B 4 db	86 V 8 (△)	II	R.g.	,,	S.(b) and D.(d)	,,	,,	,,	,,
,,	2	I B 6 kb	86 F 18 (△)	III	,,	,,	D.	,,	,,	,,	,,
,,	1	I B 7 k d	,,	II	,,	,,	,,	,,	,,	,,	,,
,,	2	I B 6 g k	,,	I	,,	,,	D.(g) and R(k)	,,	,,	,,	,,
,,	1	I B 6 k b	,,	III	,,	,,	S.(b) and D.(k)	,,	,,	,,	,,
,,	1	I B 7 k d	,,	,,	Rd.?	,,	D.	,,	,,	,,	,,
,,	5	I A 6 k	86 M 20	,,	,,	,,	,,	,,	,,	,,	,,
,,	2	,,	86 V 8 (△)	,,	,,	,,	,,	,,	,,	,,	,,
,,	11	I B 1 b	86 M 22	,,	,,	,,	,,	,,	,,	,,	,,
,,	30	I A 1 b	86 P 6	,,	,,	,,	,,	,,	,,	,,	,,
,,	17	I B 1 f	86 T 16	I	,,	R	,,	Rubbed down	,,	,,	,,
,,	41	I A 1 f	86 T 14	,,	,,	,,	R.	,,	,,	,,	,,
,,	10	I B 1 e	86 T 18	,,	Rd.	,,	—	,,	,,	,,	,,
,,	1	I B 6 k f	,,	,,	,,	,,	D.	,,	,,	,,	,,

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B. *Brunton.* Guy Brunton, *The Badarian Civilization*, London, 1928. (If marked (△) new types, drawn on Pl. XLI).

△=Drawn on Pl. XLI. *Rd.*=Reamed. *R.g.*=Rough ground. *D.g.*=Dull ground. *S.g.*=Smooth ground. *C.*=Chattered. *R.*=Rough. *D.*=Dull. *S.*=Smooth. *P.*=Polished. *Gl.*=Glazed. *Nat.*=Natural. *V.W.*=Very worn. *P.W.*=Partly worn.

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[B]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1212	3	I B 6 k f	86 T 10	I	Rd.	R.	—	Rubbed down	Steatite	Black	T.
,,	7	I B 1 c f	,,	,,	,,	,,	R.(f)	,,	,,	,,	,,
,,	1	I B 1 f	,,	IV	D.g.	,,	R.	,,	,,	,,	,,
,,	51	,,	,,	III	,,	,,	,,	,,	,,	,,	,,
1344	1	I A 1 b	86 F 3 (△)	I	Rd.	D.	S.	Turned ?	Carnelian	Clear and Venetian Red	,,
1348	1	XXVII A 1	—	—	Oval	—	—	Nat : Shell	Natica Mamilla	Faded	,,
1357	1	I B 7 g d	86 C 10 (Rough)	IV	D.g.	D.	D.	?	Steatite	New Olive Green	A
,,	1	I B 1 b	86 F 14	I ?	,,	,,	,,	,,	,,	Bronze (Green)	,,
,,	1	XXII B 2 a	89 D 4 (△)	I	Rd.	,,	—	Nat : Pebble	Wood Opal ?	White streaked with dark lines	,,
,,	1	I B 1 d	86 L 4	,,	,,	,,	R	?	Carnelian	Chrome Orange	,,
,,	1	XIII A 2 b	75 A 4 (△)	III	,,	R.	,,	Nat : Crystal	Calcite	White (translucent)	,,
,,	1	I A 6 g	86 C 10	,,	,,	,,	D.	?	Steatite	Black	,,
,,	1	XXII B 2 a	89 A 5 (△)	I	—	D. G.	—	Nat. Pebble	Wood Opal ?	White streaked with dark lines	,,
,,	1	XXVII A 1	—	—	Oval	—	—	Nat. Shell	Natica Mamilla	Faded	,,
,,	1	X A 2 b	87 C 1 (△)	I	R.g.	R.	R.	Rubbed down	Calcite	White (translucent)	,,
,,	1	I B 1 b	86 M 10	II	,,	D.	,,	?	Gypsum	,,	,,
,,	1	Unperforated similar	to above pendants	—	—	—	—	—	Wood opal	White streaked with dark lines	D.
1370	6	I C 2 b	86 K 26	III	See T.	S.	D	?	Bituminous (p. 100)	Sepia	,,
,,	3	I A 1 b—I A 2 b	86 L 6	I	—	Gl.	Gl.	,,	Carnelian	Emerald Oxide of Chromium (V.W.)	A.
,,	2	I A 1 b—I A 1 f	86 F 14	,,	—	,,	—	,,	,,	Emerald Oxide of Chromium (V.W.)	,,
,,	1	I A 1 a	86 F 10	,,	—	,,	—	,,	,,	Emerald (P.W.)	,,
1400(A)	4	I B 1 a	86 F 18	,,	D.g.	D.	—	,,	Garnet	Purple Madder Alizarin	Q.
,,	1[1]	I B 2 b	86 K 28	VI B	—	Gl.	Gl.	Moulded	Faience	Antwerp Blue	,,
,,	2[2]	,,	,,	,,	—	,,	,,	,,	,,	Transpt. Oxide of Chromium	,,
,,	1	I A 1 b	86 F 10 (Rough)	I	Rd.	D.	Chipped	?	Carnelian	Brown Ochre	,,
,,	1	,,	86 P 10	,,	,,	,,	R.	,,	,,	Chrome Orange	,,
,,	1	XXVII A	—	III	,,	—	—	Nat. Shell	Fragment	White	,,
1400(B)	1	I B 1 b – I B 2 b	86 L 4	I	—	Gl.	Gl.	?	Carnelian	,,	,,
,,	22	I B 1 b	86 F 26(△)	,,	R.g.	D.	—	,,	Ostrich ? Shell	Raw Umber (V.W.)	,,
1400(C)	1	,,	86 C 12	,,	R.	S.	S.	,,	Carnelian	Light Red	,,
,,	1	I A 1 b	86 C 14	,,	,,	,,	,,	,,	,,	,,	,,
,,	1	I B 2 b	86 M 16	,,	D.g.	D.	D.	,,	Calcite	White (translucent)	,,
,,	1	I A 1 b	86 F 10 (Rough)	,,	Rd.	,,	R.	,,	Carnelian	Brown Ochre	,,
,,	1	X A 2 b	87 C 2 (△)	II	,,	R.	D.	Rubbed down	Steatite	Permanent Brown & Black	,,
,,	1	XXII B 2 a	89 B 4 (△)	I	,,	,,	—	Rubbed on one side only	Carnelian	Light Red	,,
1400(D)	2	I A 1 f	86 T 20	III	R.g.	,,	R.	Rubbed down	Steatite	Black	,,
,,	2	I C 2 b	86 K 28	IV	?	Gl.	Gl.	Groove-ground	,,	Transpt. Oxide of Chrom. (P.W.)	,,

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△ = Drawn on Pl. XLI. *Rd.* = Reamed. *R.g.* = Rough ground. *D.g.* = Dull ground. *S.g.* = Smooth ground. *C.* = Chattered. *R.* = Rough. *D.* = Dull. *S.* = Smooth. *P.* = Polished. *Gl.* = Glazed. *Nat.* = Natural. *V.W.* = Very worn. *P.W.* = Partly worn.

BEAD REGISTER: PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[B]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1400(D)	1	I B 1 a	86 C 12 (Very rough)	IV	—	Gl.	Gl.	?	Steatite	Emerald (P.W.)	Q.
,,	1	I D 1 b	78 B 12	II	R.g.	,,					

1400(D)	2	I A 1 f	86 T 20	III	R.g.	,,	R.	Rubbed down	Steatite	Black	,,
,,	2	I C 2 b	86 K 28	IV	?	Gl.	Gl.	Groove-ground	,,	Transpt. Oxide of Chrom. (P.W.)	,,

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BEAD REGISTER: PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[B]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1400(D)	1	I B 1 a	86 C 12 (Very rough)	IV	—	Gl.	Gl.	?	Steatite	Emerald (P.W.)	Q.
,,	1	I D 1 b	78 B 12 (Rough)	II	R.g.	,,	—	Rubbed down	,,	,,	,,
1400(E)	3	XXVII A 1	—	—	irregular	—	—	Nat. Shell	Natica Mamilla	Faded	,,
1403	1	Fragments, probably	remains of a bead.	—	—	—	—	Amber	—	—	D.
1411	1	XXVII A 1	—	—	irregular	—	—	Nat. Shell	Natica Mamilla	Faded	A.
,,	3	,,	—	—	,,	—	—	,,	Nerita Polita	,,	,,
,,	1	I A 2 b	86 L 2	I	R.g.	D.	D.	?	Quartz	Light Red mottled White	,,
,,	5	I B 1 a	86 C 12	II	,,	,,	—	Rubbed down ?	Fluorspar	Gallstone (Yellow)	,,
1413	1	,,	82 A 1 (△)	I	D.g.	,,	—	Turned	Agate	Clear banded Indian Red	T.
1419	2	XXVII A 1	—	—	Oval	—	—	Whole shell	Nerita Polita	Faded	,,
,,	8	I C 1 f–I C 1 g	88 L 10 (△)	III	R.g.	Gl.	—	Rubbed down	Steatite	Rubbed off	,,
,,	30	I D 2 b	75 C 6	IV	,,	,,	D.	Groove-ground	,,	,,	,,
,,	55	I C 2 b	75 C 9	,,	,,	,,	,,	,,	,,	Emerald (V.W.)	,,
,,	12	I A 1 b	86 K 24	III	,,	,,	,,	,,	,,	Veronese Green (V.W.)	,,
,,	105	I B 2 b	86 K 28–30	IV	,,	,,	,,	,,	,,	Rubbed off	,,
1424a	1	,,	86 K 8	I	Rd.	D.	,,	,, ?	Sard	Light Red mottled and Burnt Umber	,,
,,	1	I A 1 a	86 F 14	,,	R.g.	S.	—	Turned	Carnelian	Light Red	,,
,,	1	I B 2 b	86 K 18	II	R.	D.	D.	?	Crystal Quartz	Clear	,,
,,	2	I A 1 b–I A 2 b	86 L 6	V.	R.g.	S.	S.	Turned	Agate	Mars Orange banded Red	,,
,,	2	I B 2 b	86 K 21 (△)	I	,,	See T.	D.	Chipped and turned	,,	Mars Orange banded Red	,,
,,	4	I B 1 a	86 M 5 (2) (△) and 7 (2) (△)	,,	C.	,,	—	,,	Carnelian	Mars Orange banded Red	,,
,,	1	I A 1 b	86 F 14	,,	,,	,,	D.	,,	,,	Mars Orange	,,
,,	1	I A 6 g b	86 V 18 (△)	,,	D.	D.	,,	Turned	Steatite	New Olive Green	,,
,,	6	I A 1 b–I A 2 b	86 P 12	,,	Rd.	,,	R.	,,	,,	,, irregularly stained with bright green	,,
,,	2	I A 2 b	,,	,,	,,	S.	D.	,,	,,	Permanent Brown	,,
,,	1	I A 1 b	86 P 10	,,	,,	,,	R.	,,	,,	,,	,,
,,	22	I A 1 b–I A 2 b	86 M 12	,,	,,	D.	,,	,,	,,	,,	,,
,,	1	Fragments		—	—	Decayed	—	—	Amber ?	—	D
1424b	8	I A 1 b—I A 2 b	86 M 12	I	Rd.	D.	R.	Turned	Steatite	Smoky Black	T.
,,	13	,,	,,	,,	,,	,,	,,	,,	,,	Permanent Brown (translucent)	,,
,,	17	,,	,,	,,	,,	,,	,,	,,	,,	Stained Green	,,
,,	83	,,	,,	,,	,,	,,	,,	,,	,,	Vandyke Brown	,,
,,	3	,,	,,	,,	,,	,,	,,	,,	,,	Permanent Brown (opaque)	,,
,,	1	I A 6 g b	86 V 18 (△)	,,	D.g.	,,	D.	,,	,,	New Olive Green	,,
1424c	1	I B 1 b	86 K 16 (Asymmetric)	II	R.	S.	,,	See T. 1424(A)	Agate	Indian Red	,,
,,	1	I B 2 b	,,	,,	,,	Chipped	R.	Flaked	Quartz Crystal	Clear	,,
,,	1	,,	,,	I	,,	Part S.	—	,,	Carnelian	Burnt Sienna	,,

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BEAD REGISTER: PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[B]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1424d	48	I A 2 b–I B 2 b	86 L 12	I	R.	S.	R.	Groove-ground ?	Steatite	New Olive Green	T.
,,	1	I A 2 b	,,	,,	,,	,,	D.	,,	,,	Permanent Brown	,,
,,	1	,,	,,	,,	,,	D.	R.	,,	,,	,,	,,
,,	1	I B 2 b	86 L 8	,,	D.g.	S.	D.	?	Carnelian	Burnt Carmine	,,
,,	1	I B 1 b	86 M 10	,,	Rd.	—	—	Flaked	,,	Dragons' Blood	,,
,,	1	,,	,,	,,	,,	Part S.	D.	,, and turned	,,	Indian Red	,,
,,	1	,,	86 M 3 (△)	,,	,,	S.	,,	,, ,,	Agate	Raw Sienna bordered with Indian Red	,,
,,	1	,,	86 K 12	,,	,,	D.	R.	,, ,,	Carnelian	Raw Sienna bordered with Indian Red	,,
1427	1	,,	86 K 22	VI A	D.g.	,,	D.	?	Gypsum	Burnt Umber(opaque)	Q.
,,	2	I C 2 b	86 K 28	II	,,	S.	R.	,, ,,	,,	Raw Umber	,,
,,	1	I A 1 b	86 P 12	VI A	S.g.	,,	S.	Turned	,,	,,	,,
,,	1	,,	,,	VI B	,,	,,	D.	,,	,,	,,	,,
,,	1	I B 1 b	86 K 28	II	D.g.	,,	,,	,,	Steatite	Permanent Brown	,,
,,	2	,,	86 P 12	,,	Rd.	D.	R.	,,	,,	Black	,,
,,	1	,,	86 L 4	VI A	D.g.	,,	D.	?	,,	New Olive Green	,,
1443	1	I B 1 b–I B 2 b	86 K 23 (△)	II	Rd.	S.	D.	Turned ?	,,	New Olive Green stained Oxide of Chrom.	T.
,,	5	,,	86 P 8	,,	,,	,,	S.—R.	Turned & end rubbed down	,,	New Olive Green	,,
,,	6	,,	86 K 23 (△)	,,	,,	D.—S.	R.—D.	Turned	,,	Permanent Brown with hard black specks	,,
,,	2	I B 7 h d	,,	,,	,,	,,	R.(d) D.(h)	Rubbed down	,,	Permanent Brown with hard black specks	,,
,,	1	I B 4 d b	86 V 8 (△)	III	,,	S.	S.(b) R.(d)	Turned	,,	Burnt Umber with hard black specks	,,
,,	3	I A 1 b–I A 2 b	86 M 12	II	,,	,,	R.	,,	,,	Burnt Umber with hard black specks	,,
,,	5	I A 7 h d	,,	,,	,,	,,	R.(d) D.(h)	,,	,,	Burnt Umber with hard black specks	,,
,,	3	I A 1 b–I A 2 b	86 P 10	III	,,	,,	R.	,,	,,	Raw Umber with hard black specks	,,
,,	3	,,	,,	II	,,	,,	,,	,,	,,	Raw Umber with hard black specks	,,
,,	1	I B 5 k d	86 K 23 (△)	,,	,,	,,	,,	Turned and end (d) rubbed down	,,	Raw Umber with hard black specks	,,
,,	1	I A 7 h d	86 P 10	,,	,,	,,	,,	Turned	,,	Raw Umber with hard black specks	,,
1448	2	XXVII A1	—	Rough, oval, 10	X 6 mm.	—	—	Nat. Shell	Clanculus Pharaonis	Faded	,,
,,	2	,,	—	,, ,, 3	X 2 mm.	—	—	,,	Nerita Polita	,,	,,
1457	1	I B 1 b	86 K 28	VI A	Rd.	R.	D.	?	Steatite	Raw Umber	Q.
1458	1	I C 2 b	86 K 30	II	—	Gl.	Gl.	Moulded	,,	Rubbed off	,,
1461	1	I A 1 b	86 P 6	I	R.g.	Very R.	S.	Rubbed Down ?	Ostrich ? Shell	White, one end Burnt Umber	,,
,,	2[1]	—	74 C 3 (△)	IV	—	Gl.	Gl.	Moulded	Faience	Cerulean Blue	,,
1462	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
,,	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
,,	2	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
,,	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,

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BEAD REGISTER: PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[B]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1462	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	3	I A 1 b	86 L 4	III	C.	Chipped & D.	Chipped	Turned			
	1	I B 1 b	86 M 10	II	,,	,,	,,	,,			
	1	I B 1 f	86 T 16	,,	S.g.	,,	,,	Rubbed down			
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?			
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,			
1463	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1464	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1465	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1466	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1467	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1468	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1469	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1470	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1471	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,
1472	1	I B 1 b	86 K 28	II	D.g.	S.	D.	,,	Steatite	Permanent Brown	,,
	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
	1	I B 1 f	86 T 16	II	S.g.	,,	,,	Rubbed down	Fluorspar	Cobalt Green	,,
	1	I A 1 b	86 L 4	I	R.g.	,,	,,	Turned ?	Carnelian	Light Red	,,
	1	I B 1 b	86 M 10	,,	R.g.	D.—S.	R.	,,	,,	Burnt Sienna	,,

„	2	I A 1 b	86 L 4	I	R.g.	„	„	Turned ?	Carnelian	Light Red	„
„	1	I B 1 b	86 M 10	„	R.g.	D.—S.	R.	„	„	Burnt Sienna	„

[1] Not Predynastic ?

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BEAD REGISTER: PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[B]	Beck[A]	Note	Surface	Ends				
1462	1	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	A.
„	2	I A 1 b	86 L 4	III	C.	Chipped & D.	Chipped	Turned ?	Carnelian	Venetian Red	„
„	3	I C 2 b	86 K 16	VI A	Rd.	D.	D.	Groove-ground	Limestone	Rose Doré (muddy)	„
„	2	I B 1 f	86 T 16	II	S.g.	„	„	Rubbed down	Fluorspar	Cobalt Green	„
„	1	I B 1 b	86 M 10	I	R.g.	D.—S.	R.	Turned ?	Carnelian	Light Red	„
„	1	I B 1 f	86 T 16	II	S.g.	D.	D.	Rubbed down	Fluorspar	Cobalt Green	„
„	1	I C 2 b	86 K 16	VI A	Rd.	„	„	Groove-ground	Limestone	Rose Doré (muddy)	„
„	1	I B 1 f	86 T 16	II	S.g.	„	„	Rubbed down	Fluorspar	Cobalt Green	„
„	7	I C 2 b	86 K 16	VI A	Rd.	„	„	Groove-ground	Limestone	Rose Doré (muddy and pale)	„
1469	1	I D 2 b	75 A 12	II	?	„	„	?	Resin	Black	T.
1476	1	I C 2 b	86 K 20	I	S.g.	S.	S.	„	Quartz	Black & White blended	„
„	1	I B 2 b	86 K 18	„	D.g.–S.g.	„	„	Turned ?	Carnelian	Light Red	„
„	1	I A 1 f	86 T 12	„	„	„	„	Rubbed down	„	Light Red and Burnt Umber	„
„	1	I B 2 b	86 P 10	„	R.g.	„	D.	Turned ?	„	Indian Red	„
„	2	I B 1 b	86 M 22	„	„	Chipped & S.	Chipped	Turned	„	Venetian Red	„
„	1	I A 1 a	86 F 16	„	D.g.	D.	—	?	„	Light Red	„
„	1	I B 2 b	86 P 8	„	R.g.	S.	R.	Turned	„	„	„
„	1	I B 1 b	86 M 12	„	D.g.	„	„	Turned ?	„	Mars Orange	„
„	1	I A 1 b	86 P 4	III	?	R.	R.	?	Calcite	White (translucent)	„
1478	7	XXVII B 1	About 20 × 14 mm.	Irregular 6 × 4 mm.	about	—	—	Nat. Shell	Vivipara	Faded	A.
„	2	„	„ 14 × 6 mm.	Irregular about 2 mm. Diam.		—	—	„	„	„	„
„	93	„	„ 10 × 7 mm.		—	—	—	„	Physa	„	„
„	42	„	„ 10 × 5 mm.		—	—	—	„	Pythnia	„	„
„	1	XXVII A 1	„ 12 × 9 mm.	Irregular about 2 mm. Diam.	—	—	—	„	Nerita Polita	„	„
„	5	„	„ 30 × 22 mm.		—	—	—	„	Helix Desortorum	„	„
„	27	„	Diam 6 × 11 mm.	Natural	—	—	—	Fossil Shell	Annelids *Roturia* sp.	Monochrome Warm Tint No. 1	„ B.M.N.H. (Old)(6)
„	1	XXII B 2 a	89 B 6	II	Rd.	R.	—	Nat. Pebble	Alabaster (carbonate)	White banded with Vandyke Brown	A.
„	15	I C 1 a	82 C 3	IV	—	Very R.	—	Modelled and lightly fired	Terra Cotta	Black	„
„	61+	„	„	„	—	„	—	Modelled	Mud	Raw Umber ?	„
1482	13	I B 1 b–I B 2 b	86 M 12	II	D.g.	D.	R.	Turned ?	Steatite	Vandyke Brown	„
„	23	I A 1 b–I A 2 b	86 P 10	„	„	„	„	„	„	Vandyke Brown and Permanent Brown	„
„	4	I B 1 b–I B 2 b	86 M 12	III	„	„	„	„	„	Vandyke Brown and Permanent Brown	„
„	6	I A 1 b–I A 2 b	86 P 6	„	„	„	„	„	„	Vandyke Brown and Permanent Brown	„
„	2	„	„	II	„	„	„	„	„	Vandyke Brown and Permanent Brown	„
1485	3	I B 1 b	86 L 12	I	R.g.	„	—	?	Ostrich ? Shell	Raw Umber (V.W.)	T.
1493	1	„	86 C 20	„	D.g–S.g.	S.	S.	„	Garnet	Extra Purple Madder	„
„	1	I A 1 a	86 F 16	„	?	Gl.	Gl.	Rubbed Down	Quartz Crystal	Permanent Blue	„
1502	C. 450	XXVII A 1	—	Nat.	—	—	—	Nat. Coral	*Tubipora Musica*	Faded	A. B.M.N.H. (Zoo) (few)

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BEAD REGISTER : PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[B]	Beck[A]	Note	Surface	Ends				
1502	6	XXX B 11	—	Nat	—	—	—	Beetle Thoraces	*Steraspis squamosa* Klug	Changed	A. B.M.N.H. (Ent.)(2)
,,	3	I B 5 e f	86 T 13 (△)	III	R.g.	D.	D.	?	Steatite	Vandyke Brown	A.
,,	4	I D 2 b	75 A 9	IV	D.g.	R.	R.	Groove-ground	Ivory	Changed	,,
,,	1	I B 1 a	86 T 10	I	Rd.	D	—	—	Gypsum Alabaster	White Banded with Vandyke Brown	,,
,,	1	I B 1 f	86 T 5 (△)	IV	D.g.	D.	D.	Turned ?	Steatite	Bistre	,,
,,	1	I B 1 b–I B 2 b	86 M 8	I	Rd.	,,	,,	,,	Carnelian	Indian Red	,,
,,	1	I B 1 a e	86 T 14	IV	R.g.	,,	—	?	Steatite	Permanent Brown	,,
,,	1	I B 1 a–I B 1 b	86 C 14	III	Rd.	,,	D.	Turned ?	Gypsum Alabaster	Brown Ochre	,,
,,	1	I B 1 b–I B 1 f	86 C 10	I	R.g.	,,	,,	,,	Carnelian	Neutral Orange	,,
,,	1	I B 5 e f	86 T 18	III	D.g.	,,	,,	?	Fluorite	Cobalt Green	,,
1534	1	XXXV B 2	—	I	S.g.	—	—	Nat. Tooth	Carnivone	Changed	,,
,,	1	XXXIV B 12	36 F 4 (△)	IV	D.g.	D.—R.	D.—R.	Rubbed Down	Serpentine	Black	,,
,,	1	I D 6 g b	75 A 5 (△)	VI A	S.g.	S.	S.	Turned	,,	Oxide of Chrom. with dark specks	,,
,,	1	,,	75 A 8 (△)	,,	,,	,,	,,	,,	,,	Oxide of Chrom. with dark specks	,,
,,	2	I D 2 b	75 A 12	,,	,,	,,	D.	,,	,,	Oxide of Chrom with. dark specks	,,
,,	2	I A 1 b	86 P 12	III	Rd.	,,	,,	,,	,,	Olive Green with dark specks	,,
,,	12	,,	,,	I	,,	,,	,,	,,	,,	Olive Green with dark specks	,,
,,	3	,,	,,	,,	,,	,,	,,	,,	,,	Olive Green with dark specks (pale)	,,
,,	1	,,	,,	,,	,,	,,	,,	,,	,,	New Olive Green	,,
,,	1	I L	—	,,	R.g.	D.	,,	Nat. Pebble	Garnet	Purple Madder Alizarin	,,
,,	5	I A 1 b	86 P 12	,,	R.g.	S. and Chipped	,,	Turned ?	Carnelian	Dragon's Blood	,,
,,	1	,,	86 P 10	,,	,,	,,	,,	Turned	,,	Burnt Sienna	,,
,,	5	,,	86 P 12	,,	,,	,,	,,	,,	,,	,,	,,
,,	4	,,	86 L 12	,,	,,	,,	,,	,,	,,	Mars Orange	,,
,,	15	I B 1 b	86 M 24	,,	,,	R.—D.	R.—D.	,, ?	Shell	Faded	,,
,,	2	I A 1 b	86 P 12	III	,,	,,	,,	,,	,,	,,	,,
,,	1	XXII A 1 c	89 L 5 (△)	I	,,	R.	R.	?	,,	,,	,,
,,	1	XXVII A 1	About 20 × 22 mm.	Circular 2.5 m Diam.	—	—	D.	Nat. Shell one end rubbed down	Nerita Polita	,,	,,
1538	1	I A 2 b	86 L 14	I	D.g.	D.	,,	Turned ?	Shell	,,	Q.
,,	1	,,	86 P 8	VI A	,,	,,	,,	?	Steatite	Black	,,
,,	3	I A 1 b–I A 2 b	86 P 4	III	,,	,,	,,	Turned	Shell	Faded	,,
,,	14	,,	,,	I	,,	,,	,,	,,	,,	,,	,,
,,	?[2]	XXVII A 1	—	?	—	—	—	Nat. Shell	Nerita Polita	,,	D.
,,	,,[2]	,,	—	—	—	—	—	,,	Pythynia	,,	,,
1547	1	I B 1 b	86 M 16	I	C.	S.	S.	Turned ?	Garnet	Purple Madder Alizarin	T.
,,	1	I A 1 f	86 T 14	,,	R.g.	,,	,,	,,	Carnelian	Burnt Sienna	,,
1554	1	I B 1 b	86 C 16	,,	,,	D.—S.	D.—S.	?	,,	Clear and Mars Orange mottled	,,
,,	1	,,	86 M 6	II	C.	Chipped and S.	,,	Flaked and turned	,,	Mars Yellow	,,
,,	2	I A 1 b	86 M 12	III	D.g.	D.—S.	R.—D.	Turned	Steatite	Vandyke Brown	,,
,,	1	XXVI A 3	—	—	—	—	—	Nat. Fruit or Gall	?	Changed	,,
1566	1	I D 2 b	75 A 18	IV?	?	P. (Gl?)	P. (Gl?)	?	Altered Steatite ?	Black Lead	A.

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BEAD REGISTER : PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[B]	Beck[A]	Note	Surface	Ends				
1566	2	XXVII A 1	—	Nat.	—	—	—	Nat. Coral	*Tubipora Musica*	Scarlet Madder	A.
,,	5	XXXV B 11	—	,,	—	—	—	Beetle Femora	*Steraspis Squamosa*	Changed	,,
,,	1	I C 2 b	75 C 9	IV ?	—	Gl.	Gl.	Moulded	Steatite	Rubbed off	,,
,,	1	XXVII A 1	Broken	?	—	—	—	Nat. Shell	Clanculus Pharaonis	Faded	T.

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BEAD REGISTER: PREDYNASTIC.—*continued.*

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[B]	Beck[A]	Note	Surface	Ends				
1566	2	XXVII A 1	—	Nat.	—	—	—	Nat. Coral	*Tubipora Musica*	Scarlet Madder	A.
„	5	XXXV B 11	—	„	—	—	—	Beetle Femora	*Steraspis Squamosa*	Changed	„
„	1	I C 2 b	75 C 9	IV?	—	Gl.	Gl.	Moulded	Steatite	Rubbed off	„
1567	1	XXVII A 1	Broken	?	—	—	—	Nat. Shell	Clanculus Pharaonis	Faded	T.
„	1	I B 1 a	86 S. 10 (△) (Very rough)	III?	—	Gl.	Gl.	Nat. Pebble?	Steatite?	Prussian Green	„
„	1	L A 2	86 × 3 (△)	I	Rd.	D.	D.	Rubbed down	Lapis Lazuli	Intense Blue	„
„	1	IB 1 b–I B 2 b	86 F 22	„	C.	S.	—	?	Carnelian	Neutral Orange	„
„	1	I A 1 b	86 F 20 (Very rough)	„	D.g.	„	D.	Rubbed down?	„	„	„
„	1	I A 1 a	„	„	„	R.	R.	„	Garnet	Purple Madder	„
„	3	I D 3 f	86 T 24 (△)	IV?	—	„	„	Moulded	Terra Cotta	Black	„
„	1	I B 1 b	86 M 22 (rough)	„	—	Gl.	Gl.	?	Steatite?	Rubbed off	„
„	1	I B 2 c	77 A 4 (△)	„	—	„	„	Rubbed down	Steatite	Oxide of Chrom.	„
„	1	I D 1 b	78 B 27	„	—	„	„	„	„	„	„
„	1	I D 2 b	75 A 18	II	—	„	„	Groove-ground	„	Rubbed off	„
„	7	„	75 C 6	„	—	„	„	„	„	Oxide of Chrom. (3 faded)	„
„	5	I C 2 b	75 C 12	IV?	—	„	„	„	„	Bronze (green) (faded)	„
„	7	I C 1 b	78 G 16 (△)	„	—	„	„	„	„	„	„
„	37	I C 2 b	75 C 13 (△)	„	—	„	„	„	„	„	„
„	4	I C 1 b	78 G 18 (△)	„	—	„	„	„	„	„	„
„	8	I C 1 b–I C 2 b	75 C 14 (△)	„	—	„	„	„	„	„	„
„	23	I B 1 b–I B 2 b	86 P 16	„	—	„	„	„	„	„	„
„	13	„	86 P 14	„	—	„	„	„	„	„	„
„	6	I B 1 b–I B 1 f	86 F 24	„	—	„	„	Rubbed down	„	„	„
„	1	„	„	„	—	„	„	„	„	Veridian	„
„	2	I C 2 b	86 C 12	„	—	„	„	Groove-ground	„	Black	„
1572	11	I B 1 b	86 F 24	I	C.	Chipped to S.	Chipped to D.	?	Garnet	Purple Madder	„
„	1	I A 2 b	86 P 12	„	—	Gl.	Gl.	„	Carnelian	Emerald Oxide of Chrom. (mostly rubbed off)	„
1579	41	I B 2 e A 2 f	86 T 3 (△), 7 & 20	II	?	R.	R.	Modelled	Terra Cotta	Black	Cairo 57575
„	2	I A 1 a	86 F 10	I	„	?	?	?	Carnelian	?	„ „
„	1	„	„	„	„	„	„	„	Shell	White	„ „
„	7	I D 1 b	75 Q 9	IV?	„	„	„	„	„	„	„ „
„	2	„	„	„	„	„	„	„	Coral	?	„ „
1580	1	I B 1 b	86 M 12	I	—	Gl.	Gl.	„	Carnelian	Emerald Oxide of Chrome (nearly all rubbed off)	D.
1591	1	„	86 P 12	„	R.g.	D.	D.	Rubbed Down	Carnelian	Mars Orange	T.
1596	1	I A 6 g b	86 M 20	III	—	Gl.	Gl.	Moulded	Faience	Bronze (Green)	„
„	2	I A 1 a	„	IV	—	„	„	„	„	Cobalt Green	„
1597	5	I B 1 b	86 C 16	III	Rd.	D.	D.	Turned	Steatite	Vandyke Brown	„
„	1	„	„	I	„	„	„	„	„	„	„
„	3	„	„	IV	S.g.	S.	S.	„		1 New Olive Green & 2 Permanent Brown	„
„	2	I B 1 f	86 T 17 (△)	III	Rd.	R.	R.	Rubbed down	„	Black	„
„	26	I A 2 b	86 P 10	„	„	„	„	Groove-ground	„	NewOlive Green and	„
„	13	I B 2 b	86 K 22	III and I	„	„	„	„	„	Permanent Brown	„
1501	5	?	78 W 6	?	?	D.?	D.?	Modelled	Terra Cotta	Black	
„	Short string	„	86 B 6	„	„	R.	R.	„	Clay	?	Cairo
Identity uncertain											
1503	1	I A 2 b	86 M 22	IV	—	„	„	„	Terra Cotta	Charcoal Grey (much rubbed)	T.
„	8	„	86 P 8	I	Rd.	„	„	Groove-ground	Shell	Faded	„

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BEAD REGISTER: PROTODYNASTIC.

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[B]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1207	1	I A 1 b	86 P 6	IV ?	?	Gl.	Gl.	Moulded	Faience	Cerulean Blue	T.
,,	1	I C 2 b	86 K 28	IV	—	,,	,,	,,	,,	Prussian Green	,,
,,	1	I D 2 b	75 P 9	II	S.g.	S.	D.	?	Steatite	Black	,,
,,	20	,,	75 A 2 (△)	IV	—	Gl.	Gl.	Moulded	Faience	Alizarin Blue	,,
,,	1	,,	75 A 1 (△)	,,	—	,,	,,	,,	,,	,,	,,
,,	1	I B 2 b (2 joined)	86 P 10_2 (△)	,,	—	,,	,,	,,	,,	,,	,,
1208	1	XXVII A 1	C. 13 X 11	Oval 4 × 3	—	—	—	Nat. Shell	Natica Mamilla	Faded	Q.
,,	1	I A 1 b	86 P 7 (△)	IV ?	—	Gl.	Gl.	Moulded	Faience	Alizarin Blue	,,
,,	1	I D 1 g	88 M 6 (△) (Very rough)	,,	—	,,	,,	,,	,,	,, (faded)	,,
1312(A)	2	I D 1 b	78 G 6	III	S.g.	S.	—	Turned	Carnelian	Venetian Red	A.
,,	1	,,	,,	,,	,,	,,	—	,,	Agate	White & Venetian Red	,,
1312(B)	1	I B 1 f	86 T 12	I ?	—	Gl.	—	?	Crystal Quartz	Clear	,,
,,	1	XXII B 2 a	89 A 7 (△)	I	R.g.	Gl.	—	Nat. Pebble	,, ,,	,,	,,
1312(C)	1	I A 1 b	86 C 16	,,	Rd.	S.	S.	Turned ?	Carnelian	Light Red	,,
,,	1	I B 2 b	86 L 8	,,	D.g.	,,	,,	?	,,	,,	,,
,,	1	I B 1 b	86 C 12	,,	,,	,,	,,	Turned	,,	,, (mottled)	,,
,,	1	,,	86 C 20	,,	,,	,,	—	,,	Garnet	Extra Purple Madder	,,
,,	1	I C 1 b	82 H 9	,,	S.g.	,,	—	,,	Carnelian	Chrome Orange	,,
,,	1	I D 1 b	78 D 12	,,	D.g.	,,	D.	,,	,,	Orange Vermillion & Clear	,,
,,	1	I D 1 g	88 M 3 (△)	,,	S.g.	,,	—	,,	Chalcedony	Cobalt Violet (milky)	,,
1350	1	?	86 F 15 (See M. Gedda)	?	?	?	?	?	Garnet	?	Cairo 57577
,,	2	,,	,,	,,	,,	,,	,,	,,	Carnelian	,,	,, ,,
,,	5	,,	86 L 13 (See M Gedda)	,,	,,	,,	,,	,,	,,	,,	,, ,,
,,	1	,,	,,	,,	,,	,,	,,	,,	Serpentine	,,	,, ,,
,,	4	XXII B 2 a	89 B 5 (△), 8 (△); L 3 (△), 4 (△)	I	,,	,,	,,	,,	Carnelian	,,	,, ,,
1353	10	I B 2 b	86 L 10	IV	—	Gl.	Gl.	Moulded	Faience	Prussian Green (mostly faded)	T.
,,	1	I B 1 a	86 S 11 (△)	III	—	,,	,,	,,	,,	Surface rubbed off	,,
,,	22	I A 2 b	86 M 24	IV	—	,,	,,	,,	,,	Prussian Green (mostly faded)	,,

A. *Beck.* Horace C. Beck, "Classification and Nomenclature of Beads and Amulets," *Archæologia*, Vol. LXXVII, 1928. (All reproduced on Pls. XL–XLI).

B. *Brunton.* Guy Brunton, *The Badarian Civilization*, London, 1928. (If marked (△) new types, drawn on Pl. XLI).

△=Drawn on Pl. XLI. *Rd.*=Reamed. *R.g.*=Rough ground. *D.g.*=Dull ground. *S.g.*=Smooth ground. *C.*=Chattered. *R.*=Rough. *D.*=Dull. *S.*=Smooth. *P.*=Polished. *Gl.*=Glazed. *Nat.*=Natural. *V.W.*=Very worn. *P.W.*=Partly worn.

BEAD REGISTER: OLD KINGDOM AND FIRST INTERMEDIATE.

Tomb	Number of	Shape	Perforation		Finish					

BEAD REGISTER: OLD KINGDOM AND FIRST INTERMEDIATE.

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[C]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1300	1	I D 2 b	75 K 5 (△)	XI f (△)	D.g.	S.	S.	Rubbed Down	Diorite	Black mottled with Transpt. Oxide of Chrom.	T.
„	1	I D 1 b	78 H 6	I	„	„	Broken	?	Carnelian	Light Red	„
„	1	„	78 G 12	II	S.g.	„	Chipped	Turned ?	„	Burnt Sienna	„
„	1	„	78 H 9	I	D.g.	„	S.	„	„	„	„
1306	1	„	78 P 10	IV	—	Gl.	Gl.	Moulded	Faience	Transpt. Oxide of Chrom.	„
„	11	I A 1 a	86 P 18	„ ?	—	„	„	„	„	Prussian Blue (rubbed)	„
1309	58	I A 1 b	86 M 22	VI B	—	„	„	„	„	Bronze (Green)	„
„	77	„	„	„	—	„	„	„	„	Purple Madder	„
„	207	„	„	„	—	„	„	„	„	Yellow Ochre	„
„	21	„	„	„	—	„	„	„	„	Academy Blue	„
„	3	„	„	„	—	„	„	„	„	Black (faded)	„
„	6	I B 2 b	86 M 20	„	—	„	„	„	„	Roman Ochre	„
„	3	„	86 C 28	VI A	—	„	„	„	„	„	„
„	10	„	86 M 20	VI B	—	„	„	„	„	Raynes Grey (Blue)	„
„	1	„	86 C 28	VI A	—	„	„	„	„	„	„
„	1	I A 1 a	86 N 16	„	—	„	„	„	„	Emerald Oxide of Chrom.	„
„	3	I B 2 b	86 M 12	„	—	„	„	„	„	Purple Madder	„
1310(a)	1	I A 1 b	86 M 20	„	—	„	„	„	„	Black	A.
„	1	I D 2 b	86 B 6	„	—	„	„	„	„	„	„
„	1	I A 1 b	86 M 20	„	—	„	„	„	„	„	„
„	1	I B 2 b	86 C 28	IV ?	—	See T	—	?	See T.	Black (rubbed off)	„
„	3	„	86 W 12	„	—	Corroded	—	See T.	Metal	—	„
„	1	I B 1 b	86 M 14	III	S.g.	Very S	Very S.	Rubbed down ?	Turquoise	Oxide of Chrom.	„
„	1	„	„	„	„	„	„	„	„	Olive Green	„
„	1	I D 2 b	75 C 18	VI A	Nat. ?	„ S.	S.	„ ?	Ivory ?	Changed	„
„	2	I B 1 b–I B 2 b	86 C 26	III	Rd.	Very S.	„	Turned ?	Turquoise	Hooker's Green No. 1 Light	„
„	1	I B 1 b	86 M 14	„	S.g.	„	„	„	„	Transpt. Oxide of Chrom.	„
„	1	„	„	I	„	„	„	„	Felspar	Terre Verte	„
„	2	I C 2 b	75 F 21	IV	„	„	„	?	„	„	„
„	1	I B 1 b	86 M 14	III	D.g.	D.	R.	„	Carnelian	Mars Yellow	„
„	1	I 1 A b	86 L 16	I	„	Flaked and S.	Flaked	Turned ?	„	Light Red	„
„	1	I D 1 b	78 G 18	IV	„ ?	D.	—	Rubbed down	„	Roman Sepia	„
„	1	I C 1 b	78 F 20	II	„	„	—	Turned ?	„	Brown Ochre	„
„	1	I D 2 b	75 C 14	IV	?	„	R.	Moulded	Frit	Payne's Grey (Blue)	„
„	1	I C 1 b	78 D 18	II	S.g.	S.	—	?	Carnelian	Venetian Red	„
„	1	I B 2 b	86 M 8	„	D.g.	„	S.	„	Felspar	Terre Verte	„
„	1	I C 1 a	82 F 28	„	„	D.	—	Turned	Carnelian	Venetian Red	„
„	1	I D 2 b	75 J 22	IV	—	Very D.	D.	Moulded	Frit	Payne's Grey (Blue)	„
„	1	I C 1 b	78 F 20	II	D.g.	S.	—	Turned	Carnelian	Mars Orange mottled White	„
„	1	I A 1 f	86 F 21	I	„	„	—	?	„	Neutral Orange	„
„	1	I A 1 b	86 N 10	„	S.g.	„	S.	?	„	Mars Orange	„
„	1	I D 2 b	75 J 24	IV	—	R.	R.	Moulded	Frit	Academy Blue (dull)	„

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C. *Brunton.* Guy Brunton, *Qau and Badari II*, London, 1928.

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BEAD REGISTER: OLD KINGDOM AND FIRST INTERMEDIATE—*continued.*

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[C]	Beck[A]	Note	Surface	Ends				
1310(a)	1	I B 1 b	86 C 22	I	R.g.	S.	R.	Turned ?	Carnelian	Mars Orange	A.
,,	1	,,	,,	,,	,,	,,	,,	,,	,,	Burnt Sienna	,,
,,	1	,,	86 C 16	,,	Rd.	,,	D.	,,	Felspar	Terre Verte	,,
,,	1	I A 1 f	86 F 21	,,	D.g.	,,	,,	,,	Carnelian	Burnt Sienna	,,
,,	1	I B 1 b	86 C 22	,,	R.g.	,,	R.	,,	,,	Venetian Red	,,
,,	1	I D 1 b	78 B 34	II	?	,,	—	,,	Felspar	Terre Verte	,,
,,	1	I B 1 b	86 C 22	I	R.g.	,,	R.	,,	Carnelian	Burnt Sienna	,,
,,	1	I D 1 b	78 H 18	II	S.g.	,,	—	,,	Sard	Brown Madder	,,
,,	1	I B 2 b	86 L 6	V	,,	,,	S.	,,	Felspar	Terre Verte	,,
,,	1	I D 1 b	78 F 18	III	?	,,	—	,,	Carnelian	Light Red	,,
,,	1	I C 1 b	86 B 3	I	D.g.	D.—S.	—	,,	,,	Venetian Red	,,
,,	1	I B 2 b	86 K 15	,,	,,	Very S.	D.	?	,,	Burnt Sienna	,,
,,	1	I B 1 b	86 L 24	,,	S.g.	S.	S.	Turned ?	Felspar	Terre Verte	,,
,,	1	I D 1 b	78 H 26	II	?	,,	—	Rubbed Down ?	Steatite	New Olive Green	,,
,,	1	I D 2 b	75 C 2	IV	—	D.	D.	Moulded	Glass	Cerulean Blue	,,
,,	1	,,	75 J 24	IV	—	,,	,,	,,	Frit	Academy Blue (dull)	,,
,,	1	I D 1 b	78 C 28	See T.	—	S.	—	Rubbed Down ?	Steatite	Permanent Brown	,,
,,	1	I C 1 b	86 C 18	I	D.g.	,,	—	Turned ?	Carnelian	Light Red	,,
,,	1	,,	86 B 3	,,	,,	D.—S.	—	,,	,,	,,	,,
,,	1	I A 1 b	86 M 20	VI A	—	Gl.	Gl.	Moulded	Faience	Black	,,
,,	1	I B 1 d	86 C 28	,,	—	,,	,,	,,	,,	,,	,,
,,	1	I C 2 b	75 C 28 (△)	IV	—	Altered	—	,, ?	See T.	,, —	,,
,,	1	,,	75 F 28 (△)	,,	D.g.	Very S.	S.	,, ?	Felspar	Terre Verte	,,
,,	1	I B 1 b	86 C 22	I	,,	S.	—	Turned ?	Carnelian	Neutral Orange	,,
,,	1	I D 2 b	75 F 21	IV	—	Gl.	Gl.	Rubbed down	Steatite	Veronese Green (faded)	,,
,,	1	I A 1 b	86 W 12	VI B	—	—	—	See T.	Metal	—	,,
,,	1	,,	86 M 20	VI A	—	Gl.	Gl.	Moulded	Faience	Black	,,
,,	1	I B 2 b	86 C 22	,,	S.g.	Very S.	D.	?	Turquoise	Hooker's Green(Dark)	,,
,,	1	I B 1 b	86 C 24	IV	?	Gl.	Gl.	Rubbed down	Steatite	Terre Verte	,,
,,	1	I B 5 e f	86 T 24 (△)	I	S.g.	S.	S.	?	Serpentine	Olive Green	,,
,,	1	I B 1 b	86 C 22	,,	D.g.	,,	—	Turned ?	Carnelian	Brown Madder	,,
,,	1	I A 1 b	86 C 21 (△)	,,	,,	,,	S.	?	,,	Mars Orange	,,
,,	1	I D 2 b	75 J 24	IV ?	—	Gl.	Gl.	,,	Serpentine	New Olive Green	,,
1310(b)	2	I A 1 b	86 M 20	IV	—	Corroded	—	,,	See T.	Black	,,
,,	1	I B 2 b	86 B 9	IV ?	—	Altered	—	,,	,,	—	D.
,,	1	,,	86 W 12	VI B	—	Corroded	—	See T.	Metal	—	A.
,,	1	I D 1 b	78 C 28	IV	—	R.—D.	—	Moulded	Frit	Payne's Grey (Blue)	,,
,,	2	I D 2 b	75 C 8	VI B	—	—	—	See T.	Gold	—	,,
,,	1	I D 2 b (capped)	76 A 24 (△)	IV	—	R.—D.	Gold Capped	Moulded	Frit	Academy Blue (dull)	,,
,,	1	I D 2 b	76 A 26 (△)	IV ?	—	Very S.	,,	—	Carnelian	Burnt Sienna	,,
,,	1	,,	76 A 18 (△)	,,	—	R.—D.	,,	Moulded	Frit	Academy Blue (dull)	,,
,,	1	,,	76 A 9 (△)	IV	—	,,	,,	,,	,,	,,	,,
,,	1	II D 2 b	76 A 6 (△)	,,	—	,,	Caps missing	,,	,,	,,	,,
,,	1	—	—	—	—	—	Gold Capped	—	—	—	,,
,,	1	I D 2 b	76 A 3 (△)	IV	D.g.	D.—S.	Gold capped (one missing)	Rubbed down ?	Steatite	New Olive Green	,,
,,	1	,,	76 A 12 (△)	II	,,	S.	Gold capped	?	Felspar	Cobalt Green	,,
,,	1	,,	76 A 15 (△)	IV	—	R.—D.	,, (one missing)	Moulded	Frit	Academy Blue (dull)	,,

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BEAD REGISTER: OLD KINGDOM AND FIRST INTERMEDIATE—*continued.*

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[C]	Beck[A]	Note	Surface	Ends				
1310(b)	1	I D 2 b	76 A 21 (△)	?	—	S.	Gold capped	?	Felspar	Cobalt Green	A.
,,	1	,,	76 A 28 (△)	,,	—	R.	,,	,,	Frit	Faded	,,
,,	2	I B 2 b	75 C 2	VI B	—	—	—	See T.	Gold (one broken)	—	,,
,,	1	I D 1 b	78 B 34	—	—	—	—	,,	Gold	—	,,
,,	1	I B 1 a	86 F 32 (△)	—	—	—	—	,,	,,	—	,,
,,	1	I B 2 b	86 W 6	—	—	—	—	,,	,,	—	,,
1310(c)	2	I B 1 b	86 C 28	IV ?	—	?	?	?	?	Black	,,
,,	2	I B 2 b	75 C 22	IV	—	D.	D.	Moulded	Glass	Cerulean Blue	,,
,,	1	I D 2 b	75 J 24	,,	—	R.	R.	,,	Frit	Academy Blue (dull)	,,
,,	2	,,	75 L 12	?	—	Gold	Damaged	?	?	—	,,
,,	1	I D 1 b	78 B 38	,,	—	,,	,,	,,	,,	—	,,
,,	1	,,	78 B 30	IV ?	—	D.—S.	—	,,	Steatite	Burnt Umber	,,
,,	1	,,	78 F 18	II	S.g.	,,	—	Turned ?	Carnelian	Indian Red	,,
,,	1	I B 1 b	86 F 18	I	D.g.	,,	—	,,	,,	Neutral Orange	,,
1310(d)	1	I D 2 b	75 B 24	VI A	,,	S.	S.	,,	Amazon Stone	Terre Verte	,,
,,	1	I D 1 b	78 H 26	,,	?	,,	—	?	Serpentine	Permanent Brown mottled Warm Sepia	,,
,,	1	,,	78 F 18	II	S.g.	,,	D.	Turned ?	Carnelian	Neutral Orange	,,
1311	333	I A 1 a — I B 1 a	Varying between 86 L 30, P 16, and 20	VI A and VI B	—	Gl.	Gl.	Moulded	Faience	Alizarin Blue and Cerulean Blue	T.
,,	11	I A 1 a	86 P 16, 18	VI B	—	,,	,,	,,	,,	Terre Verte	,,
,,	29	,,	86 P 14	VI A—VI B	—	,,	,,	,,	,,	Alizarin Blue and Cerulean Blue	,,
,,	27										
,,	277	I A 1 a, I A 1 b, I B 1 a, I B 1 b	86 L 26, 28; M 14; N 10, 12	VI A–VI B	—	,,	,,	,,	,,	Alizarin Blue and Transpt. Oxide of Chrom.	,,
,,	9	I A 1 a	86 M 8	VI A	—	,,	,,	,,	,,	Prussian Blue and Cerulean Blue	,,
,,	183	I A 1 a–I A 1 b	86 N 8	VI A–VI B	—	,,	,,	,,	,,	Alizarin Blue and Cerulean Blue	,,
,,	16	I A 1 b–I B 1 b	86 D 21; L 26	VI A	—	,,	,,	,,	,,	Alizarin Blue	,,
,,	1	I A 1 b	86 N 14	IV ?	—	,,	,,	,,	,,	Prussian Green	,,
,,	2	,,	86 N 12	,,	—	,,	,,	,,	,,	Cologne Earth	,,
,,	1	,,	,,	VI A	—	,,	,,	,,	,,	Black	,,
,,	1	I C 1 a	82 P 8 (△)	IV	—	,,	,,	,,	,,	Terre Verte	,,
,,	1	I D 2 b	75 B 18	,,	—	,,	,,	,,	,,	Alizarin Blue (faded)	,,
,,	1	Fragments of Amulet		—	—	,,	,,	,,	,,	Bronze (Green)	,,
,,	1	XXX	I L 14 (△)	IV	—	,,	,,	,,	,,	Cerulean Blue	,,
,,	1	XXXIII B 5	45 P 14 (△)	,,	—	,,	,,	,,	,,	,,	,,
,,	1	,,	45 P 16 (△)	,,	—	,,	,,	,,	,,	,,	,,
,,	1	,,	45 P 18 (△)	,,	—	,,	,,	,,	,,	,,	,,
,,	1	,,	45 Q 9 (△)	,,	—	,,	,,	,,	,,	,,	,,
1316	2	I B 1 a	86 C 26	,, ?	—	,,	,,	,,	,,	,, (much faded)	,,
,,	2	,,	86 C 24	,,	—	,,	,,	,,	,,	,,	,,
,,	2	I B 1 b	86 C 22	,,	—	,,	,,	,,	,,	,,	,,
,,	1	I D 2 b	75 J 24	IV	—	,,	,,	,,	,,	Olive Green (much faded)	,,
,,	2	,,	75 C 12	,,	—	,,	,,	,,	,,	Olive Green (much faded)	,,

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BEAD REGISTER: OLD KINGDOM AND FIRST INTERMEDIATE—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[C]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1316	32	I D 2 b	Fragments varying between 75 H 21; B 8	IV	—	Gl.	Gl.	Moulded	Faience	Alizarin & Cerulean Blues & Cobalt Green	T.
1322	1	XXVIII B 1	89 Z 1 (△)	—	—	?	?	?	Alabaster	White	Cairo 57576
,,	1	XXVII A 1	—	?	?	—	—	Nat. Shell	Nerita Polita	Faded	,, ,,
,,	1	,,	—	,,	,,	—	—	,,	Clanculus Pharaonis	,,	,, ,,
,,	1	XLI ,,	Similar 230 A 3 (△)	,,	,,	Gl.	Gl.	Moulded	Faience	Cerulean Blue	T.
1323	9	I A 1 a	86 N 10	IV ?	—	,,	,,	,,	,,	Bronze (Green)	,,
,,	5	I B 1 b	86 M 14	,,	—	,,	,,	,,	,,	Terre Verte	,,
,,	2	I A 1 b	86 L 28	,,	—	,,	,,	,,	,,	Cerulean Blue (faded)	,,
,,	2	,,	,,	,,	—	,,	,,	,,	,,	Black	,,
,,	1	I D 2 b	75 C 28	IV	—	,,	,,	,,	,,	Cerulean Blue (faded)	,,
,,	1	,,	75 H 8	,,	—	,,	,,	,,	,,	Prussian Green	,,
,,	1	Fragments of Amulet	,,	,,	—	,,	,,	,,	,,	Academy Blue	,,
,,	1	I A 1 b	86 L 2	I	R.g.	R.	R.	?	Carnelian	Brown Ochre	,,
,,	1	I D 1 b	78 H 21	II	S.g.	S.	—	,,	Steatite	Olive Green (translucent)	,,
1351	1	I B 6 k k	89 M 9 (△)	—	—	D.	D.	,,	Serpentine	Black	,,

BEAD REGISTER: DATE DOUBTFUL.

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[C]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1215	1	XXXVI	K 34 8 (△)	IV	—	Gl.	—	Moulded	Faience	Green Lake Deep	T.
1422	1	XXXIV B 3	P2 9 (△)	,,	—	,,	—	,,	,,	Antwerp Blue	,,
,,	1	Ring Bezel	H N 8 10 (△)	—	—	,,	—	,,	,,	—	,,
1434	1	XXVI a 1	—	Back removed	—	—	—	Nat. Shell	Cowrie: *Cyprea Annulus*	Faded	,,
1300	1[1]	I B 2 c (fluted)	88 R 3 (△)	IV	—	,,	Gl.	,,	Cowrie: *Cyprea Annulus*	Ultramarine Ash Blue	,,
,,	1[2]	I C 1 a	82 H 8	,,	—	D.	—	Strip bent round end moulded together	Glass	Leitch's Blue	,,
,,	1	I D 6 b f	78 M 18 (△)	,,	—	Gl.	Gl.	Moulded	Faience	Prussian Green	,,
,,	1[3]	L a 1	89 C 10 (△)	I	R.g.	P.	S. and Rubbed down	Nat. Pebble	Carnelian	Brown Ochre	,,
,,	1[3]	I C 1 e	86 T 0 (△)	IV	—	Very R.	—	Modelled	Terra Cotta	Black	,,
,,	1[4]	I C 1 b	86 S 9	I	S.g.	Gl.	Gl.	Rubbed Down ?	Quartz Crystal	Cerulean Blue	Q.

[1] XVIII ? [2] Arab ? [3] Pre. ? [4] Proto. ?

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BEAD REGISTER: MIDDLE KINGDOM.

Tomb Number	Number of Beads	Shape	Perforation	Finish	Manufacture	Material	Colour	Notes

△=Drawn on Pl. XLII. *Rd.*=Reamed. *R.g.*=Rough ground. *D.g.*=Dull ground. *S.g.*=Smooth ground. *C.*=Chattered. *R.*=Rough. *D.*=Dull. *S.*=Smooth.
P.=Polished. *G.*=Glazed. *Nat.*=Natural. *V.W.*=Very worn. *P.W.*=Partly worn.

BEAD REGISTER: MIDDLE KINGDOM.

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[C]	Beck[A]	Note	Surface	Ends				
1200(a)	1	XXXII B 14	21 M 7 (△)	IV ?	—	Decayed	Decayed	Moulded ?	See Text	Mars Yellow	A.
,,	1	I C 1 a	82 C 15	IV	—	,,	,,	,,	,,	Brown Ochre	D.
,,	3	I D 1 b	78 P 14	,,	—	R.	—	Modelled	Terra Cotta	Black	A.
,,	1	I C 1 a	86 P 10	,,	—	,,	—	,,	,,	,,	,,
,,	1	I A 1 a	86 L 16	,,	—	Gl.	Gl.	Moulded	Faience	Bronze (Green)	,,
,,	1	IV D 2 b f	79 G 3 (△)	,,	—	,,	,,	?	Steatite ?	White	,,
,,	1	I D 2 b	75 A 13 (△)	,,	Nat.	D.	R.	Nat. Bone	From Bird's Leg	,,	,,
,,	1	XXVII A 1	—	III	—	—	—	Nat. Shell	Conus	Changed	,,
,,	1	,,	56 G 3	IV	D.g.	Painted ?	—	Carved	Limestone	Cobalt Green (almost all rubbed off)	,,
,,	1	I B 1 e	86 T 22 (△) (Asymmetric)	I	R.g.	S.	—	Turned	Carnelian	Burnt Sienna	,,
,,	4	I C 1 a	82 F 34	IV	See T.	,,	—	Moulded	Glass	Madder Carmine	,, (Beck 1)
,,	2		82 F 32	,,	S.g.	,,	—	Turned ?	Garnet	Indian Purple	,,
,,	1	,,	86 F 12	I	,,	,,	—	?	,,	,,	,,
1200(b)	1	I A 1 b	86 P 18	IV ?	—	Gl.	Gl.	Moulded	Faience	Veronese Green	T.
,,	1	I A 2 b	86 P 14	,,	—	,,	,,	,,	,,	Ultramarine Ash(Blue)	,,
,,	1	I B 2 b	86 M 12	IV	—	,,	,,	,,	,,	,,	,,
,,	1	I A 2 b	86 P 14	,, ?	—	,,	,,	,,	,,	Rubbed off	,,
,,	1	I D 1 b	78 H 24	,,	—	Decayed	—	,,	See text	Roman Ochre	,,
,,	12	I A 1 b	86 L 26	VI B	—	,,	Decayed	,,	Terra Cotta ?	Black (rubbed off)	,,
,,	2	,,	86 L 18	,,	—	,,	,,	,,	,,	,,	,,
1200(B)	4	,,	86 L 14	,,	—	,,	,,	,,	Terra Cotta	,,	,,
,,	1	,,	86 F 21	,,	—	,,	,,	,,	,,	Warm Sepia	,,
,,	2	I B 1 b	86 C 18	,,	—	,,	,,	,,	,,	,, (altered)	,,
,,	2	I C 1 a	86 F 26	IV	—	,,	,,	,,	,,	,, ,,	,,
,,	1	,,	82 H 9	,,	—	,,	,,	,,	,,	,, ,,	,,
,,	1	I D 1 g	88 H 6	,,	—	R.	R.	,,	,,	Black	,,
,,	1	I D 6 b f	94 H 3	,,	—	Decayed	—	,,	,,	Altered	,,
1213(A 1)	1	XXXIII B 5	45 P 2 (△)	,,	—	R.	—	,,	Frit	Azure Cobalt	,,
,,	1	XXXI	2 L 7 (△)	,,	—	S.	—	Carved	Quartz	White	,,
,,	1	I D 1 a	78 D 12	II	S.g.	,,	—	Rubbed down ?	Hæmatite	Indian Purple	,,
,,	1	I B 1 a	78 D 10 (△)	,,	D.g.	D.	—	,,	Carnelian	Mars Orange	,,
,,	1	XXX	I H 5 (△)	IV	—	R.	—	Moulded	Frit	Cerulean Blue	,,
,,	1	XXXII B 2	14 D 2 (△)	,,	Rd.	Gl.?	—	Carved	Steatite	Traces of Orient Yellow (V.W.)	,,
,,	1	I C 1 a	82 C 9	II	D.g.	S.	—	Rubbed down	Hæmatite	Indian Purple	,,
,,	2	I D 1 a	78 D 12	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 J 13 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	5	,,	78 D 9 (Not quite uniform)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 D 8 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	2	,,	78 D 9	,,	,,	,,	—	,,	,,	,,	,,
,,	2	,,	78 D 8 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 J 11 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 D 4 (△)	,,	,,	,,	—	,,	,,	,,	,,

A. *Beck.* Horace C. Beck, "Classification and Nomenclature of Beads and Amulets," *Archæologia*, Vol. LXXVII, 1928. (All reproduced on Pls. XL–XLI).
C. *Brunton.* Guy Brunton, *Qau and Badari II*, London, 1928.

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P.=Polished *G.*=Glazed. *Nat.*=Natural. *V.W.*=Very worn. *P.W.*=Partly worn.

BEAD REGISTER: MIDDLE KINGDOM.—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[C]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1213(A1)	1	I D 1 a	78 J 11 (△)	II	D.g.	S.	—	Rubbed Down	Hæmatite	Indian Purple	T.
,,	1	,,	78 D 8 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 H 11 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 D 5 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 D 8 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	4	,,	78 D 9	,,	,,	,,	—	,,	,,	,,	,,
,,	2	,,	78 D 13 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 J 12 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 D 15	,,	,,	,,	—	,,	,,	,,	,,
,,	2	,,	78 D 14 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 H 13 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 D 14 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 H 17 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 J 13 (△)	,,	,,	,,	—	,,	,,	,,	,,
1213(A2)	7	,,	78 D 18, D 9 (Not quite uniform)	?	?	?	—	?	,,	?	Cairo 57579
,,	1	IV C 2 e	79 H 1 (△)	,,	,,	,,	—	,,	Carnelian	,,	,,
,,	6	I D 1 a	78 D 9, D 18	,,	,,	,,	—	,,	Hæmatite	,,	,,
1213(A3)	266	I C 1 a and I D 1 a	82 F 12; P 15 (△)	IV?	—	R.	—	Moulded	Frit	Azure Cobalt	T.
,,	15	,, ,,	,,	,,	—	,,	—	,,	,,	Terre Verte	,,
1213)A4)	9	I B 1 a	86 F 18	I	S.g.	S.	—	Turned?	Garnet	Purple Madder	,,
,,	5	,,	86 C 18	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	86 C 16	,,	,,	,,	—	,,	,,	,,	,,
,,	2	I C 1 a	82 B 12	II	,,	,,	—	,,	,,	,,	,,
,,	6	,,	82 F 26	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	82 F 22	,,	,,	,,	—	,,	,,	,,	,,
,,	1	I D 1 a	82 B 9	,,	,,	,,	—	,,	,,	,,	,,
,,	2	,,	78 D 21	,,	,,	,,	—	,,	,,	,,	,,
,,	1	,,	78 H 22	,,	D.g.	,,	—	,,	Amethyst	Permanent Mauve	,,
1213(A5)	1	I C 1 a	82 B 5 (△)	,,	S.g.	,,	—	,,	Carnelian	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	82 G 12 (△)	,,	,,	,,	—	,,	,,	Neutral Orange	,,
,,	1	,,	82 B 5 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	82 G 15 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	2	I D 1 a	78 D 16 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	I C 1 a	82 C 10 (△)	,,	,,	,,	—	,,	,,	Indian Red	,,
,,	1	I D 1 a	78 D 16 (△)	,,	,,	,,	—	,,	,,	Light Red	,,
,,	1	I C 1 a	82 G 16 (△)	,,	,,	,,	—	,,	,,	,,	,,
,,	2	,,	82 G 15 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	82 G 17 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	I D 1 a	78 D 16 (△)	,,	,,	,,	—	,,	Amethyst	Mineral Violet	,,
,,	1	I C 1 a	82 G 12 (△)	,,	,,	,,	—	,,	Carnelian	Mars Orange mottled Burnt Sienna	,,
,,	2	,,	82 G 10 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,

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BEAD REGISTER: MIDDLE KINGDOM—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[C]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1213(A5)	2	I C 1 a	82 F 20	II	S.g.	S.	—	Turned?	Amethyst	Permanent Mauve	T.

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C. *Brunton.* Guy Brunton, *Qau and Badari II*, London, 1928.
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BEAD REGISTER: MIDDLE KINGDOM—*continued.*

Tomb Number	Number of Beads	Shape		Perforation		Finish		Manufacture	Material	Colour	Notes
		Beck[A]	Brunton[C]	Beck[A]	Note	Surface	Ends				
1213(A5)	2	I C 1 a	82 F 20	II	S.g.	S.	—	Turned?	Amethyst	Permanent Mauve	T.
,,	1	,,	82 G 10 (△)	,,	,,	,,	—	,,	Carnelian	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	82 G 15 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	82 G 12 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	I D 1 a	78 D 15	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	78 D 16 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	I C 1 a	82 C 8 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	I D 1 a	78 D 15	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	2	I C 1 a	82 B 5 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	2	,,	82 G 15 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	82 C 11 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	82 G 12 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled Burnt Sienna	,,
,,	1	XXXVI	H. 92[1] (△)	,,	,,	S. (Scarab)	—	Rubbed down	Hæmatite	Indian Purple	,,
,,	1	I D 1 a	78 D 20_a (△)	,,	,,	S.	—	Turned?	Carnelian	Mars Yellow mottled Burnt Umber	,,
,,	1	,,	78 D 17 (△)	,,	,,	,,	—	,,	Agate	Burnt Sienna banded Burnt Umber	,,
,,	1	I C 1 a	78 D 16 (△)	,,	,,	,,	—	,,	Amethyst	Permanent Mauve	,,
,,	1	,,	82 G 12 (△)	,,	,,	,,	—	,,	Carnelian	Mars Orange	,,
,,	1	,,	,,	,,	,,	,,	—	,,	Agate	Mars Orange banded Burnt Sienna	,,
,,	1	I D 1 a	82 H 15 (△)	,,	,,	,,	—	,,	Carnelian	Mars Orange mottled Burnt Sienna	,,
,,	1	,,	78 D 21	,,	,,	,,	—	,,	Amethyst	Permanent Mauve	
,,	1	,,	78 D 22 (△)	,,	,,	,,	—	,,	Agate	Neutral Orange banded Burnt Umber	,,
,,	1	,,	,,	,,	,,	,,	—	,,	Carnelian	Mars Red	,,
,,	1	,,	82 G 12 (△)	,,	,,	,,	—	,,	Sard	,,	,,
,,	1	,,	78 D 19 (△)	,,	,,	,,	—	,,	Agate	Burnt Sienna, Milky bands	,,
,,	1	I C 1 a	82 G 12 (△)	,,	,,	,,	—	,,	,,	Burnt Sienna, Milky bands	,,
,,	1	I D 1 a	78 D 19 (△)	,,	,,	,,	—	,,	,,	Venetian Red banded Burnt Sienna	,,
,,	1	,,	,,	,,	,,	,,	—	,,	,,	Venetian Red, Milky & Burnt Sienna bands	,,
,,	1	I C 1 a	82 G 15 (△)	,,	,,	,,	—	,,	Carnelian	Light Red	,,
,,	1	,,	82 C 11 (△)	,,	,,	,,	—	,,	,,	,,	,,

[1] Petrie, *Scarabs and Cylinders*, Pl. LXIII (but uninscribed).

A. *Beck.* Horace C. Beck, " Classification and Nomenclature of Beads and Amulets," *Archæologia*, Vol. LXXVII, 1928. (All reproduced on Pls. XL–XLI).
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BEAD REGISTER: MIDDLE KINGDOM.—*continued.*

Tomb Number	Number of Beads	Shape: Beck[A]	Shape: Brunton[C]	Perforation: Beck[A]	Perforation: Note	Finish: Surface	Finish: Ends	Manufacture	Material	Colour	Notes
1213(A5)	1	I C 1 a	82 G 12 (△)	II	S.g	S.	—	Turned?	Carnelian	Mars Orange	T.
,,	1	,,	82 G 15 (△)	,,	,,	,,	—	,,	,,	Mars Orange mottled White & Burnt Sienna	,,
,,	1	,,	82 G 10 (△)	,,	,,	,,	—	,,	,,	Light Red	,,
,,	1	,,	82 C 11 (△)	,,	,,	,,	—	,,	,,	Mars Orange	,,
,,	2	,,	82 G 12 (△)	,,	,,	,,	—	,,	,,	Light Red	,,
1213(A6)	56	,,	82 P 9, P 6 (mis-shapen)	IV	—	R.	—	Modelled?	Terra Cotta	Black	,,
,,	1	XXXVI	H92[1] (△)	?	—	Decayed	—	Moulded?	Frit	Azure Cobalt	,,
,,	1[2]	I B 2 b	86 M 22	VI B	—	Gl.	Gl.	,,	Faience	Burnt Umber	,,
1213(A7)	7	I D 1 a	78 C 22; D 12[3]	?	—	?	?	?	Hæmatite	?	Cairo 57578
,,	1	,,	78 C 20	,,	—	,,	,,	,,	Amethyst	,,	,, ,,
,,	7	,,	78 C 22; D 12[3]	,,	—	,,	,,	,,	Hæmatite	,,	,, ,,
1213(A8)	1	I D 1 b	78 J 18 (△)	II	S.g.	S.	S.	Rubbed Down?	,,	Indian Purple	T.
,,	2	I D 1 a	78 J 16 (△)	,,	,,	,,	,,	,,	,,	,,	,,
	3	,,	78 J 15 (△)	,,	,,	,,	,,	,,	,,	,,	,,
	1	,,	78 J 17 (△)	,,	,,	,,	,,	,,	,,	,,	,,
	1	I D 1 b	,,	,,	,,	,,	,,	,,	,,	,,	,,
	3	,,	78 J 21 (△)	,,	,,	,,	,,	,,	,,	,,	,,
	1	I D 1 a	78 J 20 (△)	,,	,,	,,	,,	,,	,,	,,	,,
	3	I D 1 b	78 J 20 (△)	,,	,,	,,	,,	,,	,,	,,	,,
1213 (C)	230	I C 1 a	82 F 32; P 15 (△)	IV?	—	R.	—	Moulded	Frit	Azure Cobalt	Cairo 57580
1213 (D)	1	,,	82 B 4 (△)	II	D.g.	Very S.	—	Turned?	Agate	Mars Orange banded Neutral Orange	A.
,,	1	,,	,,	,,	,,	S.	—	,,	Diorite	Black and White	,,
,,	1	,,	,,	,,	,,	,,	—	,,	Carnelian	Mars Orange mottled Light Red	,,
,,	1	I D 1 b	78 C 20	,,	,,	,,	S.	,,	Amethyst	Permanent Mauve	,,
,,	1	I B 1 a	86 L 30	IV	—	D.	—	Moulded	Glass	French Blue	,,
1213(G)	1	I D 1 g	88 P 8 (△)	,,	—	D.—R.	D.—R.	Modelled	Terra Cotta?	Black	T.
,,	44	,,	88 P 7 (△)	,,	—	,,	,,	,,	,,	,,	,,
,,	1	I C 1 a	82 C 13 (△)	II	D.g.	S.	—	Turned?	Amethyst	Permanent Mauve	,,
,,	1	,,	82 C 11 (△)	I	,,	,,	—	?	Garnet	Purple Madder	,,
,,	1	,,	82 H 12	II	,,	D.	—	Rubbed Down?	Diorite	Black and White	,,
,,	1	I D 1 a	78 J 16 (△)	,,	,,	S.	—	Turned?	Carnelian	Neutral Orange clouded with Maples Yellow	,,
,,	1	XXVII B 1	13 mm.	2 mm. Diam.	—	—	—	Nat. Shell	Conus	Faded	,,
,,	1	XXVII A 1	19 mm.	Back of shell rubbed down		—	—	,,	Cowrie	,,	,,
1213(H)	1	I D 1 a	78 C 24	II	D.g.	P.	—	Turned	Carnelian	Light Red	,,
	1	,,	78 D 18	,,	,,	D.	—	,, ?	Felspar	Transpt. Oxide of Chrom.	,,
	1	I D 1 b	78 F 12	,,	R.g.	R.	R.	?	Garnet	Purple Madder	,,
1213 I	7	XXII	89 T 2 (△)	I?	—	—	—	Rubbed Down	Mother of Pearl		,,
1213	1	I C 1 a	82 B 2 (△)	IV	—	Gl.	—	Moulded	Faience	Antwerp Blue	,,
		,,	82 C 9	VIII A1? (△)	D.g.	S.	—	Turned	Carnelian	Mars Orange and Burnt Sienna	,,

[1] Petrie, *Scarabs & Cylinders*, Pl. LXIII. [2] From inside another bead. [3] Varied in shape and size.

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CHAPTER VI

METAL OBJECTS

THE metal objects from the cemeteries were few, and no " museum pieces " were found, but there are one or two interesting specimens. Professor Bannister's metallurgical report is on p. 118, and the objects are shown in photograph on Pls. XLIII and XLIV, Fig. 1, and in line on Pl. XLVI.

From the Predynastic period come two copper bangles (Pl. XLIII, Figs. 1, 2, 3 and 4, and Pl. XLVI) with interesting wire fastenings, described in full by Professor Bannister. In the same cemetery was found an iron ring (Pl. XLIII, Fig. 1, top left) which was very considerably oxidised and might therefore have been contemporary with the bangles. This was unfortunately lost in the post on its way to be analysed, so it is impossible to confirm its date by discovering if it were meteoric or not.

In the Protodynastic tomb 1207, the toolmarks in the very hard clay of which the walls were composed appeared to be too clean to have been made with stone tools. The width of the tool blades was about 8 cm. and the average depth of the cuts 4 cm. Close inspection of the walls showed on two projecting stones, in different places, a green stain, undoubtedly of copper corrosion, and it is highly probable that the tombs were dug with copper tools. On the floor of the tomb were found four copper tools (Pl. XLIII, Fig. 1, top row, and Pl. XLVI). Two of these are in the Cairo Museum. One of the remainder, p. 119, was analysed by Professor Bannister and proves to be of great purity. These tools are too small to have been those used in constructing the tomb. Similar but larger tools are shown in *Tools and Weapons*, Pl. I, at S.D. 78 from Diospolis Parva and S.D. 81 from Tarkhan. Only two objects, of which analyses are given by Lucas (*Ancient Egyptian Materials and Industries*, pp. 424–425), show any comparable nickel content, a Middle Predynastic axe found by Brunton, and the great copper statue of Pepy I.

The brass ring at the top right of Fig. 1, Pl. XLIII, was found in the filling of 1313, an unrobbed tomb of the Second or Third Dynasties. If it is to be regarded as later than the burial, it is difficult to account for its presence, for the remains of a wood coffin showed clearly that the burial had not been disturbed, and the other objects found with the ring in the filling, two *spatha rubens* shells, belong to an earlier, rather than a later, period. A natural ore of copper and zinc is found in Georgia and the Caucasus (Lucas, *op. cit.*, p. 189), not too far away to have been traded with Egypt ; but there is no evidence of metal ores having been brought so far at this early date. Moreover, the ring has the appearance of a late object, and it may almost certainly be regarded as intrusive.

The only metal object of Middle Kingdom date, apart from some beads which are described on pp. 84, is a mirror from 1213 A which is shown in the tomb group on Fig. 5, Pl. XIV. A higher tin content than one per cent might be expected for a mirror, since these are often made

[1] Petrie, *Scarabs & Cylinders*, Pl. LXIII.

[2] From inside another bead.

[3] Varied in shape and size.

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C. *Brunton.* Guy Brunton, *Qau and Badari II*, London, 1928.

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P. = Polished. *G.* = Glazed. *Nat.* = Natural. *V.W.* = Very worn. *P.W.* = Partly worn.

of speculum metal, containing about 33 per cent of tin, but the Middle Kingdom is, after all, only at the beginning of the Bronze Age proper.

In order to gauge the original reflective power of such a mirror, one without any *fundplatz* (not from Armant) was scrubbed clean with pumice and polished by Mr. Murphy of the Central School of Arts and Crafts. Pl. XLIX, Fig. 1 shows the statuette from 1214 reflected on the one side in this mirror and, on the other, in a good modern shaving glass. Since the camera did not at first do justice to the high reflective power, a yellow filter was used for the photograph published. Though every effort was made to get the lighting even, it appears from the shadows on the back of the figure, that the light was rather brighter on the side of the modern glass.

It should be noticed that the products of corrosion could not be altogether eliminated, and give a haziness to the image which would not be present if a new mirror were made of the same materials.

While cleaning the mirror it was discovered that one side was slightly concave and the other slightly convex. Unfortunately the cleaning had been begun on the convex side and, the corrosion having penetrated deeply, it was not thought safe to polish down the concave face also. The convexity is rather reduced in the photograph, partly by cleaning, and partly because the image is towards one end of the mirror. The concave face enlarges considerably. Careful examination of a number of cleaned mirrors should show whether or not this concavity was a regular, intentional feature. Mr. Glanville tells me that a silver mirror at U.C.L. is concave and convex.

O. H. M.

Analyses and Descriptions

By Professor C. O. Bannister.

Ar. 1547 *S.D.* 46–63. *Copper bangles.*

This sample consisted of a number of small pieces as shown in Fig. 1 of Pl. XLIII (lower row); these had originally consisted of copper which had corroded practically throughout to the centre. A few pieces or parts of pieces showed that a central thread of copper still remained.

The most interesting of these pieces is shown in Fig. 2, nearly twice the original size. It is 1¾ in. long and at one end there are indications of some form of fastening having been used. A portion of this end has been ground down on one side and the result is shown in Fig. 3, which indicates that a second copper wire had originally been wrapped round, probably to connect the two ends of the bangle together or possibly as a method of ornamentation only.

An enlarged view of this wrapping is shown, magnified twelve times, in Fig. 4, in which the wrapped wire is clearly seen. The spaces between the wrapped wire and the bangle wire itself are filled with a corrosion product rather different from that occupying the positions of the original wires, being bluish-green in colour in contrast to the dark red of the wires.

The corrosion product as a whole consists of a mixture of cuprous oxide, basic copper carbonate, and basic copper chloride, and is slightly contaminated on the outside with particles of attached sand.

An analysis of the corrosion product gave the following results:

	%
Copper	77·6
Carbon dioxide	2·3
Combined water	4·2
Silica	1·7
Nickel	0·05
Gold	0·1
Silver	trace
Lead	0·1
Iron	0·2
Arsenic	trace
Chlorine	2·84
Oxygen by difference	10·91

This would account for the copper being present as follows:

Basic copper carbonate $Cu\,CO_3\,Cu\,(OH)_2$	11
Basic copper chloride $Cu\,Cl_2\,3Cu\,(OH)_2$	17
Cuprous oxide	69

Ar. 1207 *S.D.* 80. *Copper Tool.*

This tool is shown in Fig. 2, Pl. XLIII (No. 4, top row). It is 2⅛ in. long and 1⅛ in. wide, rounded off at the bottom. It tapers off in thickness from the top to the bottom, being about 0·08 in. thick at the top and 0·035 in. thick at the bottom. This proves to be a copper tool showing under the microscope no penetration of corrosion product, but a small amount of oxide inclusion, as illustrated in Fig. 5 at a magnification of 700 diameters. The following is the analysis of the metal

	%
Copper	98·54
Nickel	1·17
Oxygen	0·08
Lead	0·005
Iron	0·005
Arsenic	present
Silver	traces
Gold	,,
Bismuth	,,

Ar. 1313 *Fourth to Sixth Dynasty. Brass Ring.* (*Intrusive?*)

This ring as received is illustrated on Pl. XLIII, Fig. 1 (No. 6 of the top row); it was about ⅛ in. in diameter, the metal was approximately circular, the diameter of the wire being 0·052 in., and was free from corrosion products and only tarnished.

A section under the microscope showed the beautiful yellow colour of brass and was quite free from foreign inclusions or corrosion penetration.

An analysis of the metal gave the following results, confirming that it is brass made from copper containing gold:

	%
Copper	67·5
Zinc	31·1
Gold and Silver	1·2
Lead	0·3
Nickel	0·01
Bismuth	0·005
Arsenic, Iron and Tin	traces

Ar. 1213 *Middle Kingdom. Copper mirror.*

This is a metallic mirror consisting of copper containing a small amount of tin, about 1 per cent, and may from this analysis be considered to be a very low tin bronze ; on the other hand, it may be considered as copper containing the one per cent tin as impurity, together with arsenic, lead, zinc, silver and antimony also as impurities. The arsenic, about 1 per cent, is unusually high for bronze.

The mirror is completely covered with corrosion products consisting for the most part of hydrated copper carbonate, together with a variable amount of insoluble earthy matter, mainly sand.

This corrosion product also shows the presence of small quantities of compounds of arsenic, tin, lead, zinc and silver.

C. O. B.

REGISTER OF METAL OBJECTS

Object	Material	Size	Fund-platz	Date of Tomb	Refs. in Text and Notes	Illustrations Φ	Illustrations △	Distribution
Frags. 2 bangles	Copper	*Diam.* 6 *Th.* 0·4	1547	S.D. 48–63	pp. 118	XLIII 1–4	XLVI 3	Ashmolean
Ring	Iron (Meteoric?)	2·3 0·5	1494	„ 38–67	(Intrusive?)	„ 1	„ 5	Lost in post.
		Lth. *Wth.*						
Axe ?	Copper	6·7 4·2	1207	„ 80		„ 1	„ 1	Cairo 57584
„	„	7·0 4·0	„	„ „		„ „	„ 2	Toronto
„	„	6·7 4·2	„	„ „	pp. 119	„ 1 & 5	„ 1	Queen's Coll.
„	„	„ „	„	„ „		„ 1	„ „	Toronto
Frag. of tool ?	„	3·7 1·7	„	„ „				„
Ring	Brass	*Diam.* 2·3 *Th.* 0·13	1313	Dyns. IV–VI	p.119(Intr.?)	„ 1	„ 4	„
Mirror	Copper	c 15 c 0·1	1213A	„ XI–XIII	p. 120	XIV 5 (Cf. LIV 1)		„
Sword	Steel ?	*Lth.* 48 *Wth.* 3	1204A	c A.D. 1910	p. 23			„

CHAPTER VII

THE GESSO OBJECTS

THESE three objects from tomb group 1466 (Pl. XIII, Fig. 6) were the most interesting find of the season's work. The tomb was satisfactorily dated to S.D. 38–48 and was reasonably well stocked with objects. It had unfortunately been plundered, and the head and arms of the body, which was that of a man, had been removed. The tomb was probably originally the richest of its date in the cemetery. It is shown on Pl. XLVII, Fig. 1, at $\frac{1}{15}$.

The only known occurrence of anything similar in the Predynastic period was at Naqada. Petrie says (*Naqada and Ballas*, para. 42, grave 271) : " Behind the figures (ivory) were remains of cloth painted with stucco in red, green, black and white." There is no further description of the find nor any illustration. Evidently its importance was not appreciated at the time on account of the theory, then held by the author, that the Predynastic peoples were a new race contemporary with the Dynastic period. The grave was, like that at Armant, an important one, and probably, allowing for the robbing at Armant, more important, in consonance with the generally richer standard of the Naqada cemetery. Its date was S.D. 38 (*Pre. Egypt*, Pl. LI). The use of green paint at this date is interesting. It was, no doubt, malachite.

The first object, C (Pl. XLVII, Fig. 4 ($\times \frac{1}{2}$)), was a very thin layer of gesso about 0·4 mm. thick, and 21 cm. by 13 cm. at its greatest dimensions. This was lying over the heel of the right foot. Most of it was black in colour but the black was delimited on two sides by white in such a manner as to give the impression of a heel. This was enhanced by the boot shape of the whole object, which was entirely fortuitous, since no original edge was left. Thus the impression was given that there had been a layer of plaster over the body, with the shape of the body filled in in black—a primitive cartonnage, in fact. Such an early development, though very unlikely, is not impossible, but if it started at S.D. 38 at Armant it might be expected to occur in tombs of a later, Predynastic date. Moreover, although the lower part of the body had been relatively little disturbed, no more of this object was found, yet if it had covered the whole corpse, at least some more fragments should have been traced ; though, since it was certainly incomplete, the missing fragments remain a mystery whatever its original shape.

The two other similar objects, if more complete and more interesting, are equally mysterious. For their positions in the grave see Pl. XLVII, Fig. 1.

Complete, and hardly damaged, S might have been expected to give some clue to its purpose, but none has yet been found. It is shown at two-thirds natural size in Fig. 3, Pl. XLIV and at half size in Fig. 3, Pl. XLVII. Its greatest length is 14 cm., and its greatest width 10 cm., but this includes a fragment that has slipped at the bottom. Its original widths were probably 8·3 cm. and 6 cm. at either end and 5·3 in the middle. The thickness is a little under a centimetre and very variable. The colouring is Indian red with a double white cross, obtained by leaving the gesso plain. Apart from the familiar design (which led an evening paper to

produce the headline: " Scots Wha Hae—in Ancient Egypt " and strengthened the faith of a British-Israelite) the resemblance of the object to a flag is insistent. But rectangular flags are unknown from ancient Egypt, and the triangular pennants are of much later date. Yet the design of this and D are both more like abstract patterns than attempts at representing a concrete object.

The method of manufacture of S was interesting. It was made in two laminæ, which were stuck together. Each lamina was made by coating a piece of linen with the gesso, probably by dipping. The painting was done after they were stuck together. There is no apparent reason why a single object was not made and painted both sides. This specimen is in the Cairo museum and is therefore not reported upon technically below, but it may be assumed to be similar in composition to D.

D was much destroyed when found. It is shown at the same scales as S in Fig. 2 of Pl. XLIV and Fig. 2 of Pl. XLVII. Its present size is 19 cm. × 5·5 cm. × (about) 0·8 cm. thick. It is now slightly convex on the face shown, but this is probably due only to the action of the celluloid solution with which it was raised. The ground surface is white and the lines alternately black and Indian red, the innermost being black. Owing to its damaged state, it is difficult to discover how it was manufactured, though it is clear that there were not two laminæ as in S, but one sheet of linen plastered and painted on both sides. At the present moment the object is folded over, and it is highly improbable that it will ever prove possible to restore it to anything approaching its original condition. The painting of the object is partially reconstructed. The fold at the back has been traced and placed in its correct position, and the more certain missing parts have been coloured, a line delimiting the restoration, while the less certain have been drawn in line, and dotted line. The bands of colour are more probably oval than circular. The reverse and obverse of a piece of the edge (1) are shown at the bottom left-hand corner, and I suggest that the left-hand view is the part belonging to the pattern obscured in the large portion of the object. The most puzzling fragment, a small parallelepiped (3), is shown in two views at the right-hand bottom The model of a shield might seem a possible explanation of the object, more especially as the Masai to-day carry shields painted in simple curves of red, white and black, though without any closely corresponding pattern. Every effort has been made to match up the colour, although it is only printed in line (that is, flat without any of the normal graduations and shading).

In order to obtain the fullest possible information about these unique objects several experts were consulted and their reports, which follow, need little comment.

The possibility that the objects were made from quicklime can be eliminated as a result of Professor Brammall's examination.[1] Lucas says (*Ancient Egyptian Materials and Industries*, p. 73): " No instance of the use of lime mortar in Egypt, or of lime in any form, is known to the author as occurring before the time of Ptolemy I (323 to 285 B.C.)." On p. 30 he says: " Several specimens of plaster from this tomb (that of Tutankhamūn) . . . analysed by the author, consisted of whiting (chalk) with a mixture of nitrogenous organic matter that might have been glue, since so far as could be determined from the small amount of material available for analysis, there was no other adhesive present and some adhesive is essential, whiting possessing no natural coherence whatever. Plaster of this nature (i.e. whiting and glue, which is termed ' gesso '

[1] See also Dr. Thomas's report on mortar from 1330, p. 142.

by Egyptologists) has been identified by the author from the Third Dynasty . . . and also from the Fifth Dynasty . . . it was employed on a large scale in the Eighteenth Dynasty. . . . Where this plaster was on wood there was sometimes a layer of coarse woven fabric (canvas) between the two."[1]

We cannot assume that some adhesive must have been present in the specimens examined, because the analysis of C contained no nitrogenous matter. Professor Briscoe has kindly sent the following notes: " I would not entirely rule out, as Lucas does, the possibility that a coherent mass might be formed from water and calcium carbonate alone, though it seems more probable that some organic binder may have been used. The quantity might be small, possibly too small to detect with certainty in these analyses, say one per cent or less." Professor Brammall suggests as an alternative that the limestone contained about five per cent of clay and could have been made to bind by heating to quite a low temperature.

It will probably not be possible to settle this question until further specimens have been found and analysed.

On p. 131 Dr. Ritchie shows that the pigments used were carbon and pure red ochre, and on p. 131 ff Mr. Midgley describes the mechanical structure.

O. H. M.

Analysis of Gesso Ar. 1466.

By Janet W. Matthews, Ph.D., F.I.C.

Sample Marked C.

The sample had been preserved with collodion, and this was removed before the analysis by extracting six times with hot acetone and centrifuging each time. The dried residue was then examined qualitatively. Under the microscope the fine particles appeared to be homogeneous dust. The analysis gave indications of no organic matter and the material appeared to consist mainly of calcium carbonate with the smallest trace of silica. Magnesium and sulphate were both absent.

The quantitative analysis was carried out on two samples of the powder which were treated in a slightly different manner. The analysis by method I, which is more lengthy, is more accurate.

METHOD I. General Method. The material was ignited, to give the carbon dioxide content, fused with sodium carbonate and dehydrated by evaporation with acid to determine the silica content, and the calcium determined as oxalate in the filtrate.

Detail. The sample was weighed on a Kuhlmann micro-balance into a 2 cc. platinum crucible and dried at 100° C. for 1½ hours. As the loss of weight was very slight (results below) it appeared that the acetone treatment had effectually dehydrated the material. The crucible, supported on a micro-silica triangle, was then ignited over a bunsen burner, first gently and finally at bright redness for fifteen minutes, the platinum tare used in weighing being similarly ignited. The crucible was cooled on a copper block under cover for ten minutes and for fifteen

[1] Mr. Lucas tells me that he has himself extracted and identified glue from one of the Tutankhmūn samples of gesso and points out that Professor Laurie (A. P. Laurie, *Materials of the Painters' Craft*, 1910, p. 27) definitely states that in one sample examined by him the gesso was certainly composed of chalk and glue.

minutes on a second copper block beside the balance case, the tare being similarly treated. The crucible was then weighed, the loss of weight representing the carbon dioxide content plus any trace of organic matter.

Although this method for determination of carbon dioxide is not very precise, the figures given below indicate that it is accurate enough for the purpose, since the calcium determination gives the exact calcium carbonate of the material, the carbon dioxide determination being required only to check the figures.

The residue in the crucible was then fused for half an hour with three to four times its weight (that is about 15–20 mgm.) of pure sodium carbonate (Merck). The tare was heated for a similar length of time. After cooling, the melt was treated with 1 cc. of pure distilled water (conductivity water was used) and neutralised with redistilled hydrochloric acid, finally adding 0·3 cc. excess acid. This solution was then evaporated to dryness over the water bath, the evaporation being accelerated by means of a tiny stream of filtered air blown on to the surface, and the residue was baked in an air oven at 100° C. for ½ hour, evaporation and drying were repeated twice to ensure complete dehydration of the silica. The contents of the crucible were then taken up in 1 cc. of water and 6 drops of hydrochloric acid (redistilled) and filtered through a King filter of diameter 0·5 cm. (*Analyst* 1933, *58*, 325 ; also described in *Micro-chemical Methods Suitable for General Analytical Practice*, Inst. of Chem. Publ. 1934, p. 7). Washing was carried out with 5 per cent of hydrochloric acid, and the filtrate of total volume 2 cc. was collected in a micro beaker that had been weighed together with an Emich filter stick of porcelain. The filter paper pad was poked out into the platinum crucible, which was dried, ignited and weighed to give the weight of silica in the sample. Calcium was determined in the filtrate by adding 0·5 c.c. of pure 3 per cent oxalic acid and a micro-drop of neutral methyl red solution, heating over a water bath at 100° C., and then precipitating the calcium as oxalate by adding 10 per cent ammonia, drop by drop, until the precipitate was permanent. The mixture was heated for two minutes over the water bath and then neutralised to methyl red with ammonia, and allowed to stay a further five minutes on the water bath. The beaker was then left to cool under cover and after half an hour the contents were filtered through the Emich filter-stick which had been weighed with the beaker. (The apparatus employed for the suction filtration of these small quantities is illustrated in Fig. 2, p. 7, of *Micro-chemical Methods*, loc. cit.) The precipitate was washed five times with 0·5 c.c. of hot water, and then the beaker with the stick inside was dried for half an hour in an air oven at 105° C., at which temperature the calcium remains in the form of $Ca(COO)^2 H_2O$. The beaker and filter-stick were then cooled, wiped with dry and moist chamois leather according to the technique usual in weighing glass apparatus on the micro-balance, and finally weighed. The filtrate from the calcium determination was again tested for magnesium and for sulphate, with negative results.

METHOD II. The sample was treated in the same way except that the fusion with sodium carbonate and subsequent evaporation three times with hydrochloric acid to dehydrate the silica were omitted. In this procedure any calcium or other silicate present would probably not be decomposed to give soluble salts and insoluble silica, and it is, of course, impossible to obtain correct figures for the total silica by this means, but it serves as a rapid check on the results and also gives an approximate estimate of the amount of calcium silicate present from the

difference between the calcium contents determined by the two methods. The figures obtained by the more tedious Method I must be taken as the more accurate.

RESULTS OF ANALYSIS OF SPECIMEN C.

C.	*Sample*	Loss of Wt. after 1½ hrs. *at* 100° C.	Loss of Wt. on *ignition*	*Wt. $Ca(COO)_2H_2O$*	*Wt. CaO*	*$*SiO_2$*	*Total*
Method I Weight in mgm. % of dry weight	6·000	0·020 0·3†	2·550 42·7 (CO_2)	8·762	3·35 56·02	0·02 0·3	5·940 99
Method II Weight in mgm. % of dry weight	7·580	0·020 0·3†	3·248 42·9(CO_2)	10·925	4·20 55·46	Not determined	

* Not treated with hydrofluoric acid.
† Calculated on weight of original sample.

Sample S was examined in the same way. The qualitative analysis also showed that the material was largely calcium carbonate, and that magnesium and sulphate (and therefore gypsum) were absent. More siliceous material was present than in sample C, also small amounts of iron, aluminium and sodium. Organic matter was present, traces of organic pigment being visible on the surface of the fragment before treatment with acetone.

The quantitative analysis was carried out as before by the two methods. Sodium, aluminium and iron were not determined : these elements were probably present as silicates, but only to a small extent, as is shown by the fact that the analysis of the fragment gave a total of 94 per cent, leaving only 6 per cent to account for the total of these three elements.

In the results given below the loss on ignition is separated into organic matter and carbon dioxide, the carbon dioxide content being calculated as the amount required to convert the calcium oxide to carbonate. The figures thus calculated are, of course, only approximate.

The insoluble residue obtained by Method I, where the material is treated with acid without fusion, may be allocated roughly as shown in brackets, the calcium figure being taken as the difference between the calcium content determined by Methods I and II.

RESULTS OF ANALYSIS OF SPECIMEN S.

S.	*Sample*	Loss of Wt. after 1½ hrs. *at* 100° C.	Loss of Wt. on *ignition*	*Wt. $Ca(COO)_2H_2O$*	*Wt. CaO*	*SiO_2*	*Total*
Method I Weight in mgm. % of dry wt.	3·800	0·015 0·41[1]	1·515 39·9 { 34·5 CO_2 5·4[2]	4·345	1·67 44·0	0·38 10·0	3·57 93·9
Method II Weight in mgm. % of dry wt.	4·678	0·010 0·2*	1.765 37·7 { 33·3 CO_2 4·4†	5·155	1·98 42·5	Insoluble residue 0·64 13·7 { 10 SiO 1.5 CaO 2·2 other elements	

* Calculated on weight of original sample.
† Organic matter.

DISCUSSION.

The analysis of the fragment C shows that it is a nearly pure specimen of calcium carbonate. Thus the mortar may have been made by roasting limestone to obtain calcium oxide (CaO), and mixing the result with water to form slaked lime ($Ca(OH)_2$) which is a paste which would conveniently stick to the linen and take the pigments on its outer surface. The fragment analysed could have been formed by the hardening of this slaked lime through the action of carbon dioxide with the resultant formation of calcium carbonate ($CaCO_3$). In the small specimen analysed there was no evidence of linen fibres, or of sand.

The analysis of sample S indicates that it is a mixture of 80 per cent calcium carbonate with 20 per cent sand. The mortar was possibly made in the same way as sample C, except that the slaked lime was mixed with a little sand to " bind " it. It is assumed that the two fragments analysed were representative samples of the whole relic.

The presence of considerably more organic matter in S than in C may be a real difference, or may be due only to sampling. The presence of this organic matter may indicate that the mortar was made, not from burnt lime but from powdered limestone ground up with an organic binder, such as starch or glue.

The fact that the analysis of sample C, omitting organic matter, adds up to 99 per cent, indicates that in this example the amount of binder used, if any, must have been extremely small (assuming, of course, that the sample is representative) and lends some colour to the burnt limestone theory : unfortunately, however, no definite decision can be made from the analytical data obtained.

The writer is indebted to Professor H. P. Laurie's previous work on the subject (*Analyst*, 1933, *58*, 468), whereby information as to the probable nature of the mortar was obtained which facilitated the process of the qualitative analysis.

J. W. M.

Addendum.

By Professor H. V. A. Briscoe.

[During Dr. Matthews's absence in the country, Professor Briscoe kindly examined the specimens by a direct test for alkalinity, with a specimen of Egyptian limestone as a check.] He reports :

" I find that, while the samples C and S certainly exhibit a faint alkaline reaction, as was suggested by Dr. Matthews's original investigation, the sample of Egyptian limestone shows a very similar reaction.

" It follows that nothing in Dr. Matthews's report is inconsistent with the possibility that the samples S and C may have been originally made from powdered limestone or other naturally occurring specimens of calcium carbonate derived therefrom.'

Petrological Report.

By Professor A. Brammall.

The particles of plaster were carefully mounted in the manner of ordinary rock-sectioning.

For the purposes of comparison, a thin section was made of the pottery limestone—using a small chip taken from the edge of the slab.

Preliminary considerations.

The substance of the plaster was less massive, less coherent, than that of the limestone. Accordingly, the thin section was prepared by " slow rubbing down " with the finest abrasive powder available.

This method largely eliminated the possibility of " abrasion grooving," which is liable to simulate a " texture or microstructure " actually foreign to the specimen. In two of the sections thus prepared, this ambiguous grooving is almost negligible : in parts of the slice it is completely absent.

The Limestone.

This is an extremely fine-grained compact rock, in which numerous relics of organisms are discernible—in the " clearer " spots seen in the figure (inset circle).

Some appear to be circular or sub-circular outlines representing cross-sections of foraminifera ; others seem to be more like the ossicles of crinoids, but a palæontologist would be able to express a more reliable opinion.

Other " clear, quadrate, or polygonal " spots appear to be splint-like fragments of definite fossil-forms—preserved in calcite, which often shows an extremely fine, delicate, lamellar structure common in the calcite of many fossil-forms.

In addition there are minute grains of quartz, together with specks (spherical, ovoid, or irregular) suggesting cherty silica—which may be of organic origin (algal ? radiolarian ? Here again, the palæontologist might find something determinative in these " forms ").

The Plaster.

In general appearance, under the microscope, the plaster closely resembles the limestone —in opacity and tint, in texture and material, in " clear areas " and matrix. The main difference is one which is consistent with expectations resting on the assumption that the plaster was made from limestone by a process involving crushing : it is the fact that, numerically, the " clear areas " of all kinds are subordinate to those seen in the limestone.

On the other hand, one small fragment of the plaster (figured in part) supplied a " fortunate find "—

(a) a portion of a circlet, in mosaic-calcite, with geometrically crenulate margin, and a core spot recalling the umbilicus in crinoid-ossicles.

If this unit were originally circular, the loss of a segment from the lower part of the circlet may be due to attrition.

So delicate a " form " on so minute a scale, would, I maintain, be completely destroyed under the heat conditions necessary to convert limestone to quicklime.

(b) (c) (d) (e) (f) splint-like, quadrate, to irregular fragments of organisms—comparable with, but smaller and more irregular than, those in the limestone.

In most cases, these fragmental units are composed of calcite micromosaic ; but some are faintly, others distinctly, lamellar.

One area, (b), is a clear homogeneous calcite-rhomb. Its secondary origin is certain, but whether it has any organic significance is doubtful—at least to me. Another area is laminated, and may still be secondary ; but it compares closely with units of organic nature in the limestone itself.

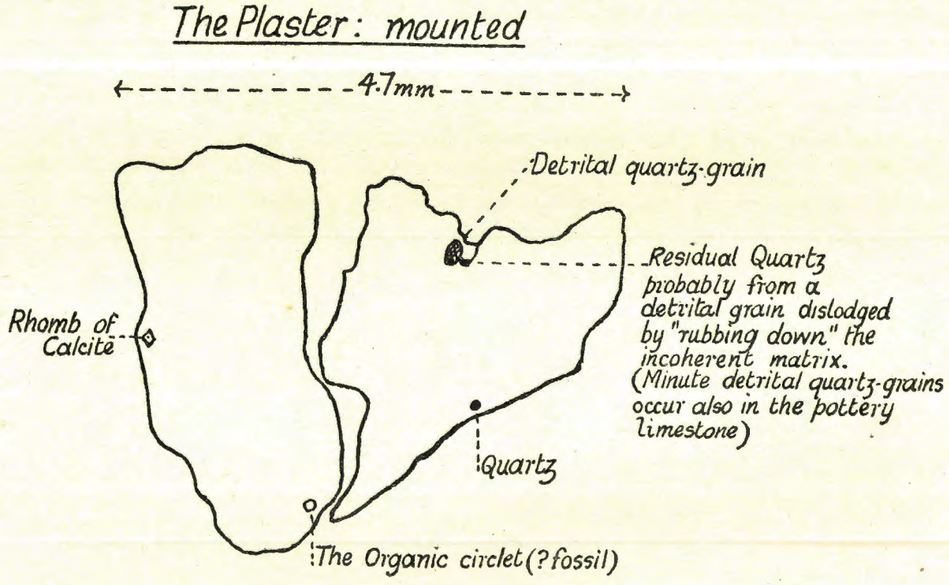
(c) A few minute granules of quartz, (d), together with suspect chert-spots.

If the plaster were made from the limestone by calcination (i.e. kilning), one would expect that every morphological detail of geometrically-patterned organisms would have been completely obliterated. This expectation would rise in proportion to

(a) the heat applied.

(b) the minuteness of the fossil, and the delicacy of its patterning.

Accordingly, it is difficult to account for the unit " a " in the plaster—which, if fortuitous, is a remarkable imitation, in geometry and morphologic detail, of familiar fossil forms. If it is an " imitation " (a pseudo-fossil), the umbilical centre-spot is the last word in deceit! Moreover, the fracture-like embayment in the lower part of the circlet is astonishingly *like* a real fracture—due to the loss of a segment of the original circlet. Finally, the thin section of limestone contains somewhat similar circlets, and one of them is figured (inset to figure).



The same line of argument could well be applied to the " quadrate, splint-like, and irregular " clear spots of calcite-mosaic: these could well be comminuted fragments of larger units seen in the limestone.

Here must be again adduced the close similarity between the plaster and the limestone—in respect of tint and opacity, texture and microstructure. I cannot detect in the plaster any texture or microstructure which differentiates it from the limestone in such a way as to suggest that the difference is due to the progressive change from quicklime to calcite.

My conclusion is that if the plaster were made from the pottery limestone, the limestone was crushed—but not " kilned " to a temperature sufficient to evolve quicklime, which would require heat destructive of such morphological patterning in micro-organisms as is seen in the limestone itself—and either preserved or (though I doubt this) " simulated " in the plaster.

A Rider.

I have no information at all concerning the analysed bulk composition of either the plaster or the limestone. Not enough material was available to make even a micro-chemical test on the plaster, and, without such data, no useful purpose would have been served by making separate tests on the pottery limestone.

On the other hand, such information is always of the utmost value in petrological work such as this, and I offer a few suggestions which might be helpful in consolidating any opinion formed.

I suspect there is more than a mere " trace " of both silica and alumina in the pottery limestone.

I also suspect there is " ferric iron "—in quantity above that of a " trace." There may be a little ferrous carbonate too.

If the limestone were " kilned," there should be some significant difference between the plaster and the limestone—in the *direction of* " less ferrous and more ferric iron " *in the plaster.*

If the limestone contained only a small percentage of clay-body (hydrated aluminous silicate), it is at least possible that the ancients knew, and utilised, the property of " hydraulicking "—i.e. the heating of calcareous clay-body to drive off some portion of the water, which would re-enter the system on mixing the powdered material with water: in other words, the moistened powder would " set." If the pottery limestone contains, say, a few per cent of hydrated aluminous silicate, the limestone may have hydraulicking properties, and kilning to the temperature required to produce quicklime may not have been necessary.

Addendum.

Since writing the above I have been able to read through the analysis of the plaster and the commentary on this.

On p. 126 Dr. Matthews says: " Sample S. is a mixture of 80 per cent calcium carbonate with 20 per cent sand." The sample (S) I received included a fragment which, in the mounted section, shows *one* relatively large, rounded and composite quartz granule, and a minute relic of what I believe to be another, and similar, sand-grain dislodged, and lost, in grinding. Still another quartz-particle occurs in the same fragment. The figure opposite shows the loci and relative sizes of these three particles.

Professor A. Morley Davies has very kindly made a palæontological examination of the pottery limestone and the plaster in thin sections, and he has authorised me to state (1) that the " circlet " is, in his opinion, certainly organic, i.e. fossil; that it is not an Echinoderm, but may just possibly be Bryozoan; but beyond the conviction that it is *not* an Echinoderm, he cannot be more definite on the matter of its identity; (2) that this " circlet," being organic, is strongly opposed to the hypothesis of calcination to the temperature needed to produce quicklime.

I agree with Professor Briscoe that if powdered limestone were moistened with ordinary water, *some* degree of cementation by recrystallised calcite could conceivably occur—in time, without the agency of quicklime. Admixture of feebly calcined clay body would produce the same result—much more effectively.

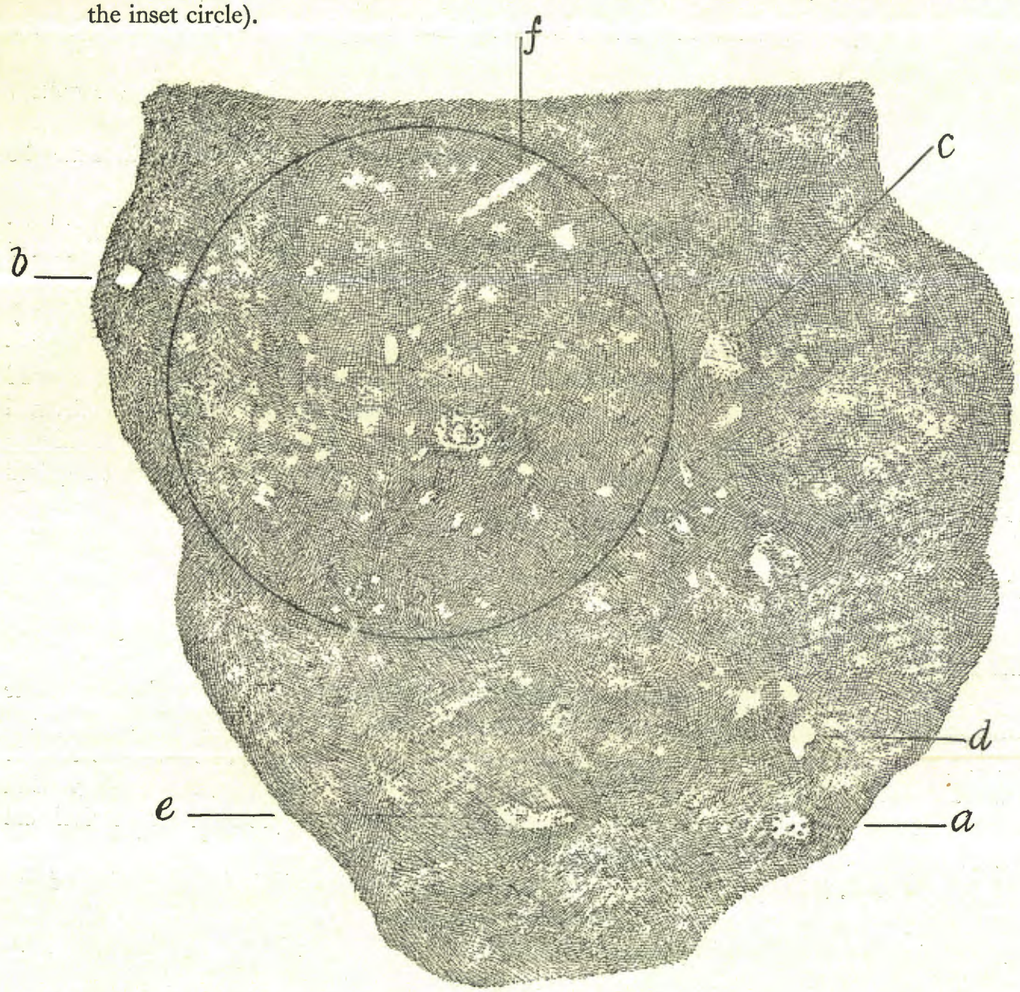
Explanation of the Diagrams.

Comparative study of the texture, opacity, and frequency of " clear areas " in the *plaster* (main area, irregular in outline) and the limestone (inset circle).

Magnification : 42 diameters.

(a) A segment of a circlet, with patterning recalling a crinoid ossicle.

A somewhat similar " organic relic " occurs in the limestone (near the centre of the inset circle).



(b) A rhomb of clear homogeneous calcite.

(c) An angular fragment of calcite showing minutely lamellar structure.

(d) An irregular ovate area of calcite.

(e) A splint of calcite-mosaic ; compare the splint in the limestone (top right-hand corner of inset circle).

(f) Splint of calcite, with faint lamellar structure, and comparable with recognisable relic-organisms.

A. B.

The Paint on Gesso S. Ar. 1466.

By Dr. P. D. Ritchie.

Question :

" Identify the black and red pigments, and supply any other information of interest which is readily available."

Report.

The samples were of a laminated nature—a layer of white stucco, between two layers of textile, this " triplet " in turn being enclosed between two further thin layers of stucco, pigmented on the outer surface in black or red.

The samples, being loose and friable, had been protected by the finder during transit by a coating of celluloid in acetone/amyl acetate. This, while acting efficiently as a mechanical support, had permeated thoroughly into the surface layers of the pigment. It was, therefore, impossible to test directly for any organic binding medium in or near the pigment layer (e.g. glue or size) : and it was found impossible to extract the celluloid completely by means of organic solvent without disintegrating the pigment layer. The question of the binding material had therefore to be left open : but it may be recorded that a sample of the stucco, dissected out from the very centre, between the two layers of textile, gave practically no charring or discoloration on heating with conc. H_2SO_4 and therefore presumably contained little or no organic matter.

The black pigment was carbon. Examined under a low-power microscope (30 diameters) some of the individual particles showed distinct traces of a charred wood fibre structure : and on heating gently in a silica spoon they glowed and burned away.

The red pigment was iron oxide, and dissolved completely in conc. HCl.

Attempts were made to dissect out a few of the textile fibres : but they were so fragile and " perished " that this was unsuccessful. Pl. XLVIII, Fig. 6 gives some impression of the textile structure, under a magnification of about 20 diameters.

The Fabric of Gesso C and S. Ar. 1466.

By Mr. Thomas Midgley.

43·34·4 *Stuccoed Linen Ar.* 1466 *C.*

A fragment $\frac{3}{4}$ in. × $\frac{3}{4}$ in. A portion of the surface of the stucco is marked with black pigment. The remainder shows a plain woven fabric structure. Four layers of such fabric can be seen on the edge of the fragment. The stucco seems to have been used in a very fluid condition, so that it formed a thin coating over the layers as a foundation and penetrated into every " pick " of the weave. The fabric has the appearance of having had a deposit of travertine which has retained the structure of the weave but not the actual material. A close examination shows that the yarn, of fibre, is in all cases preserved inside the little tubes of stucco. On the back of the fragment are bits of reed fibre, not woven or spun. Impressions in the stucco surrounding these indicate that other and larger pieces of fibre have been used in the foundation to which the thin stucco was applied.

43.34.6 *Stuccoed Linen. Ar.* 1466 *S.*

This is similar to the fabric of C but shows the structure more clearly. The large fragment, which is roughly ½ in. square, has a fine smooth surface with a line of black pigment drawn upon it. At one corner the smooth and extremely thin facing film has broken away, disclosing another thin layer of coarser stucco resting on fabric. Below this are four other thin deposits of stucco with layers of woven material between each. This is well shown in one of the fractured edges. The back of the fragment shows three of the layers of fabric. They are all of a plain weave, the yarns being of fibre. The two innermost layers are very lightly encrusted ; the texture is only just covered. The deposit in the third layer, nearer the face, is more dense and the texture of the enclosed cloth difficult to follow. The stucco was presumably applied in a very dilute form, with just sufficient binding material to fix the sheets of fabric together. This formed a foundation for the thicker stucco which was used between the outer sheets of cloth. A specially fine mixing of stucco, applied thinly, formed the smooth external layer upon which the inscriptions were drawn.

The four smaller fragments are of similar but less revealing character.

Description of Plates.

Pl. and Fig. No.	*S.D.*	*Chadwick Museum No.*	*Description.*
XLVIII 1 8 1466	38–48	43.34.6	Gesso. S Plan, showing the layers of stucco-covered fabric.
„ 2 8 „	„	43.34.4	Gesso. C Plan, showing layers of stuccoed fabric, the structure masked by sandy deposit and thick stucco.
„ 3 8 „	„	43.34.6	Gesso S. Edge of fragment showing layers of fabric and stucco. The broken yarn is represented in the photograph by the two lines of more or less circular black marks stretching between x and x and X and X.
„ 4 8 „	„	43.34.4	Gesso C. Edge of fragment taken at a slight angle shows the broken yarns in the stucco x to x and the thin layer of fine stucco above it. The black patch at the top is the pigment.
„ 5 8 „	„	43.34.6	Gesso S. Photograph of edge of the fragment at an angle, showing three layers O, O, O, and the broken tubes of stucco-covered yarn at x to x and X to X.

T. M.

CHAPTER VIII

MISCELLANEOUS OBJECTS

A Skin Garment.

In tomb 1483, belonging to the earlier part of the Predynastic period (though without sequence date), was found a gazelle skin in better preservation than most from this cemetery (Pl. XLIV, Fig. 6). The body over which it was placed was that of a man. The skin was removed whole and was transferred to London for examination. It was hoped at first, by the use of collodion solution, to unwrap the dress fold by fold and to lay it out on a sheet of glass ; this being the method recommended by Drs. Scott and Plenderleith of the British Museum. The task, however, proved an impossible one, and the stronger parts of the skin were saturated in collodion solution and then carefully examined for such information as they might yield. Despite the failure to discover the shape of the garment certain interesting features were revealed.

The large number of seams, some of them running at right angles to each other (Pl. XLV, Fig. 1 ($\times \frac{8}{9}$)), showed that the object was not the very simple gazelle skin covering that might have been expected ; but must have been of a moderately complicated nature, unless it was a patchwork of a number of different pieces of skin sewn together. The latter is an unlikely hypothesis since gazelle skins were frequent finds in graves and there is no reason to suppose that they possessed any great value.

Two curious features were discovered. In at least one place the skin was joined so that the same surface consisted partly of the outside of the hide and partly of the inside (Pl. XLV, Fig. 3 ($\times \frac{4}{3}$))—perhaps this was a collar. Even more curious was the sewing of textile to the hide (Pl. XLV, Fig. 1). The piece of fabric was apparently not very large but, being crumpled together, its size was difficult to judge. It was saturated with some substance (resin ?) which had caused it to form a hard lump. The linen seems to have been sewn on to the garment in a much rougher manner than that in which the separate pieces of the garment were joined together (Pl. XLV, Fig. 1), though it was sewn with a rather finer thread, apparently as fine as the threads of the linen itself. Mr. A. Lucas, from a quick examination of the thread with a lens, suggested that it might be vegetable fibre. It appears just possible from the general appearance that the fabric may have been sewn on in the form of a bag, possibly full of resin, and it would be difficult to do this and make a neat join. Perhaps the resin so frequently found in graves was carried about for some imaginary prophylactic purpose—a habit surviving to the present day.

The seams between the different pieces of hide were oversewn and the distance between the stitch-holes was about 2 mm. (1·9 ± 0·6 from 17 determinations) and the width of each stitch-hole was about a quarter of a millimetre (Pl. XLV, Fig. 2 ($\times \frac{8}{3}$)). The determination of the width of the stitch-hole by linear measurement was a difficult one and measurements were also made with some modern needles. We found it impossible to pass through the holes a

size 10 needle, which is the smallest size of steel needle in ordinary use to-day. Experiment with fresh leather showed that no great contraction of the hole takes place after it has been pierced, since the skin is thrust up solidly round the hole, giving a crater-like effect. This was clearly visible on the ancient material. In chamois leather, which is much softer and in which the surface was not displaced by the needle in the same way, it was found that the size 8 needle produced approximately the same sized hole as was found on the ancient garment. It seems, therefore, that the needle used could not possibly have been larger than size 8 and was probably smaller than size 10 in modern units of measurement. Measuring seven needles of each size, we obtained widths of 0·52 mm. in size 9, and 0·46 mm. in size 10 for each needle.

The manufacture and use of such fine needles at so early a date is astonishing. If made of such a soft material as copper, they would hardly have stood up to the work required of them. It is suggested that fishbones were used.

Feathers.

Pl. XLV, Fig. 4 shows a feather object something in the shape of a fan, though with the base very thick and the outside highly convex. The inside is slightly concave. The object came from tomb 1492 (S.D. 39–67). It was first submitted to Dr. P. R. Lowe of the British Museum (Natural History), who was unable to identify the feathers, but was able to state that they were not of an ostrich, and possibly belonged to one of the waders, such as the ibis, heron, or crane (p. 142).

The object was next shown to Mr. E. Gerrard (of Messrs. Gerrard & Son, Naturalists, College Place, N.W.1), who made the reconstruction on Pl. XLV, Fig. 5. He was quite certain that the object was a manufactured one. Running a pin into the thick part of the base a hard substance was encountered over a wide area. This could not be wood or it would have decayed and been eaten by termites, like all other ancient wood in the neighbourhood. The probability is that it is clay, which would be a simple substance into which to fix feathers. In the reconstruction, cork has been used in its place. Mr. Gerrard held the view that the feathers were probably those of some bird such as a bustard or grouse. The feathers of the sand-grouse were chosen for the reconstruction, because these were the easiest to obtain of any which might have been employed in the original, while their use does not conflict actively with Dr. Lowe's report. Mr. Gerrard was convinced that the skin at the base could not be bird skin, and African-tanned goat was selected as the original was likely to have been goat or gazelle skin. The facsimile and the original are in the Ashmolean Museum.

A Bag.

In 1446 (S.D. 42–67) was a small basket-work bag which had been used for containing malachite. This is shown on Pl. XLV, Fig. 7. It was necessary to wax it in order to raise it, and just below it in the photograph can be seen some small angular pieces of malachite waxed to the soil which was raised with it. This object is in the Wellcome Historical Medical Museum.

A Dog.

The last figure on Pl. XLV is the photograph of the dried body of a dog found lying across the entrance to tomb 1305. This is discussed in the description of the tomb on p. 24. It is in the Wellcome Historical Medical Museum.

A Bun or Loaf.

In some pots were found small round cakes of vegetable matter, about the size and shape of a modern bun. One of these is shown inside pot b (L30h) from 1590, resting on the mud with which the canny offerer had filled the remainder of the large vessel (Pl. XLIV, Fig. 4). Another one was found in pot d from the same tomb, the date of which is S.D. 76–77. It is likely that the brown powder sometimes found in small quantities on top of the mud in similar pots at a like date is the remains of the same thing. Mr. Boodle has identified the material as grains, probably of Emmer-wheat (p. 138).

Ivory and Bone Objects.

A general view of objects made of these materials is given in Fig. 5 of Pl. XLIV, while drawings of the more important are on Pl. XLVI. The better photographs of these objects are the tomb groups, to which reference will be given as the objects are discussed.

Decayed parts of a vase (1597) which could not be reconstructed, and of unrecognisable objects (1501) were submitted to Dr. F. C. Fraser of the British Museum (Natural History) for identification, who reported that they were all probably hippopotamus ivory.

The bone point of 1300 was found with the pot BB19k and is probably E.P.III (Badarian) in date.

The ivory wands or flat tags from 1461 are shown in a group photograph on Pl. XIII, Fig. 2. The date of the grave is 43–50, whereas comparable material in *Pre. Egypt* (Pl. XXXIII, 26, 27, and 34) is dated 38–40. The comb from 1457 is too broken to make any useful comparison with other material. It is shown in its group on Pl. XIII, Fig. 1. Combs with birds similar to that from 1510 are dated 31–47 (*op. cit.*, p. 29), but nothing is shown quite like the plainer comb. The date of the tomb 1510 is 43–46. The group photograph of 1572 showing the ivory playing pieces and stone marbles is on Pl. XIII, Fig. 4. This tomb is unfortunately not dated. Similar pieces are figured in *Naqada and Ballas*, Pl. LXII. The ivory vase from 1438 is similar to No. 16 on Pl. XLVIII of *Pre. Egypt* which is undated. The shell bangles are shown in their group (1579) on Pl. XIII, Fig. 5. The date of the tomb ranges over the whole Predynastic period (E.P. IV. to L.P.) and tomb 1554 from which the small bangle comes is not dated. The larger type of bangle is dated in *Pre. Egypt* from 31 to 33 (p. 31, Pl. XXXI). The rear quarters of an animal (probably a hippopotamus) in mud and a fragment of an ostrich egg shell require no comment.

Beds.

The remains of a wooden bedstead was found in tomb 1511 (S.D. 41–66). An isometric drawing of this is on Pl. XII and a photograph on Pl. IX, Fig. 2. To the wooden frame was strung a plaited fabric to form the " spring " of the bed, and this is described by Mr. Midgley on p. 139. A bed of S.D. 66 was found in grave 3 at Naqada. Petrie describes this as " . . . a bed frame carved with bulls' feet, the hind legs at the south end, by the head." *Naqada and Ballas*, p. 24. This is in the Manchester Museum. The Armant example was too decayed to preserve and it is not possible to say whether it was carved or not.

The wooden frame, of which an isometric drawing is given on Pl. XII, from 1466 (38–48) possibly belonged also to a bedstead, though no trace of legs was found. This was waxed and brought home in the hope that it might be possible to discover the jointing ; it is in the Ashmolean

Museum. The object is metric and it is possible that there is some significance in the fact that the two greater spaces are each 26 cm. (or half a Royal cubit) in width, but the other dimensions do not confirm the Royal cubit as the measure used in construction. Across the frame were run twigs of Tamarix (see Mr. Boodle's report on p. 137) 0·7 cm. in thickness, with intervals of 0·3 cm. between them. About four rows of twigs ran longitudinally at each side of the frame, but otherwise the direction of the twigs was entirely latitudinal. On top of the twigs was some reed matting and on top of this again some fabric (Midgley, p. 140). The original length of the bed could not be ascertained but was probably about 140 cm.

There was clear evidence of a superstructure to the bed, or alternatively a roof to the tomb, and a wall lining. The latter seems the more probable hypothesis. This "canopy," whether to the bed or the tomb, rose to a height of about 82 cm., was made of matting, supported by a wooden frame, and was apparently lined with a textile (see Midgley, p. 140). A small fragment of a "string bag" or similar object was also found in this tomb (see Midgley, p. 140).

In 1520 was found some wicker work belonging either to the wicker coffins known from this date or to a bed like the modern *sarir* of the district. The fragment found (see Pl. IX, Fig. 1) was waxed and brought home for future examination; it is in the Wellcome Historical Medical Museum. Pl. XIV, Fig. 6, shows in a general way what such a bed looks like, but, unfortunately, the manufacturers did not follow the instructions given them, and the details of the plaiting are wrong. Traces of similar objects were found in tombs 1510 (42–46), 1473 (46), 1595, and 1596 (41–51) (see Boodle on 1595 and Midgley on 1510, pp. 138 and 139 respectively).

Baskets.

A rectangular basket, 47 × 20 × 12 cm., was found in 1566 (42–59), and a photograph of this is given on Pl. IX, Fig. 3. The basket contained pots P40e, P40h, D36a$_1$, and R22a. An unsuccessful attempt to preserve some of the basket was made. Emmer was found in the box (Boodle, p. 138).

A circular basket containing corn (Boodle, p. 138) was found in 1471 (38?). It was waxed and presented to the Wellcome Historical Medical Museum. Fragments of a similar basket covered a pot, R81, in 1517 (41–67) and these are reported on by Midgley on p. 140. Other fragments from the same basket are in the same museum.

Coffins.

Traces of wood coffins were found in two Predynastic graves, 1481 (37) and 1518 (73–77). In the latter, the coffin appeared to be about 75 cm. wide.

A number of coffins of the Dynastic period were found, but not one was in a state in which any part could be preserved. These are listed in the register. Some showed traces of gesso and the most interesting of these was that from 1309A, apparently of Old Kingdom date, which was originally painted with a text. The only surviving fragment was copied by Baly and is given below. There can be no doubt that of the lower burials in the tomb, B and C were of the Old Kingdom, but a slight doubt remains about burial A which may have been inserted later. It is worth mentioning that in the robbed cemetery to the east of the house, consisting of deep vertical shafts of typical Old Kingdom type, there are found fragments of painted gesso round the mouths of many of the pits. In tomb 1209, dug by us, fragments of this plaster were found in the chamber.

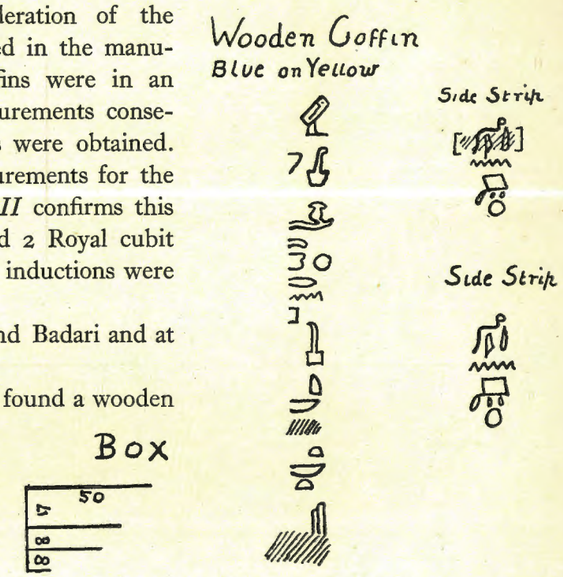
The Archaic coffins were made of boards with gaps between them varying from 0·25 and 2 cm. in width, filled in roughly with mud, spreading each side sometimes as much as 3 cm. In 1319 the mud was pressed in with the fingers when wet. In tomb 1330 (Fifth–Seventh) the coffin was plastered inside and out with a coarse white plaster, and for an account of this see pp. 141 f. Similar plaster was found with the coffins of 1310 (Fourth-Fifth) and 1311 (First Intermediate).

The remains of wood coffins in 1213 mostly showed traces of painted gesso and they were, almost certainly, all covered with this originally. Only the merest traces of the wood and plaster remained.

It appears from a general consideration of the dimensions that the Royal cubit was used in the manufacture of the coffins, but since the coffins were in an advanced state of decay, and the measurements consequently inaccurate, no very useful results were obtained. An examination of the list of coffin measurements for the Old Kingdom given in *Qau and Badari II* confirms this impression, the use of 3 Royal cubit and 2 Royal cubit lengths being tolerably certain, but careful inductions were not made.

The general types of coffin at Qau and Badari and at Armant appear to be the same.

In 1301 A, a burial of Late date, was found a wooden box divided into compartments as shown. It was plastered inside and out, except at the bottom where the plaster was inside only. The box was supported by a rock on each side.



1301A

1309

There follow Mr. Midgley's report on the textiles, mattings, basket-work, etc., Mr. Boodle's report on the vegetable remains, Dr. Hallimond's report on the cosmetics, a report by Professor Hilditch on the contents of the gypsum jar in 1466, and another by Dr. Dighton Thomas on the mortar from the coffin in 1330.

O. H. M.

The Vegetable Remains

By Mr. Boodle

1466. Twigs. Twigs of a species of *Tamarix*, in part charred.

1209B. (Under E.P. III (Badarian) bowl BB19k.) Husks. *Sorghum* (Durra or Durra Millet). The specimen has been identified at the Kew Herbarium by Mr. Hubbard as *Sorghum bicolor*, Moench (one of the cultivated races included under *Sorghum vulgare*). The specimen certainly appears to be of no great age, and its presence requires some explanation, probably of the kind suggested. (That the material had been introduced in recent times by a mouse or other small mammal using the bowl as a hiding place. Though this suggestion was made to account

for the state of the specimen it must be pointed out that careful work revealed no evidence in support of it. O.H.M.).

1207. Wood of a species of *Acacia* ; also charcoal apparently from wood of both *Acacia* sp. and *Tamarix* sp.

1209B. Contents of E.P. III (Badarian) bowl BB19k. Fragments of stem or leaf of a grass, possibly Emmer-wheat.

1408. Tree root. Wood and bark of *Acacia* sp.

1424A. Resin. Gum resin.

1425. Wrappings. Not identified. Apparently leaf or stem of a Monocotyledonous plant, but not a grass, nor a sedge, nor a palm.

1431. Leaf or stem of a grass.

1442. Contents of pot. Grains of a grass, probably barley.

1459. The same as 1425.

1471. Contents of basket. Grains of grass, probably Emmer-wheat.

1473. Tree root and matting. Root apparently *Tamarix* sp. Matting the same as 1425.

1473. Contents of pot a, B11f. Grains of a grass, probably Emmer-wheat.

1486. Matting and contents pot b, P24n. Matting the same as 1425. Contents of pot, grains of a grass, probably Emmer-wheat.

1500. Bark. Not identified.

1510. Resin. Gum-resin.

1514. Contents of pot e, B38c1. Grains of a grass, probably Emmer-wheat. Contents of pot f, W43g, the same and also fragments of charcoal, probably of *acacia* sp.

1517. Matting. The same as 1425.

1529. Resin. Resin.

1530. Resin ? Gum-resin.

1533. Bed. Not identified.

1542. Resin. Gum-resin.

1566. Contents of pot k, P40h. Largely stem and leaf of a grass. Contents of box. Parts of grass, including grains, probably Emmer. Contents of pot g, R81, fragments of a grass, including grains, probably Emmer-wheat and Barley.

1577. Contents of pot g, W43b. Grains, probably Emmer-wheat.

1591. Contents of pot f, P24l. Fragments of a grass, probably largely grains of Emmer-wheat.

1595. Canopy ? A grass, chiefly leaf and stem, and a few grains, possibly Emmer-wheat. The wood of *Acacia* sp.

1590. Bun from pot b, L30h. Largely grains of a grass, probably Emmer-wheat.

1305. Dog's bed. Pieces of leaf, leaf-sheath and spathe of Maize, also tufts of hair (Mammalian), and a piece of bone (see p. 24 O.H.M.).

The material consists, in many cases, of small plant-fragments mixed with sand. Pieces of charcoal are sometimes present also, but are not mentioned in the report, when not identifiable.

Where grains of Emmer-wheat or Barley are mentioned, this means that the chaff, i.e. the glumes, or portions of them, were found, the grains themselves having, for the most part, decayed.

The leaves, etc., from the " dog's bed " do not appear to be of great age, so their appearance agrees with their identification as maize, since this plant was not present in Egypt in early times.

The Matting and Fabrics.

By Mr. Thomas Midgley.

20.32.1. Grass Matting. Ar. 1535 (S.D. 44–61).

Made of flat strands in close layers crossing more or less at right angles. Many layers thick. No cross tie-bands. Small fragments, very rotten. Dark brown.

20.32.2. Grass Matting. Ar. 1457 (S.D. 35–53).

Made up of parallel bundles of stems in many layers, tied together at irregular intervals. The fragments are too small and decayed to determine the frequency or course of the tie-bands. Two fragments of bone adhere to the matting. Very decomposed. Dark brown.

20.32.3. Grass Matting. Ar. 1451.

Bundles, many layers of parallel stems, stitched through at irregular intervals with thread made of twisted grass. A number of layers have been fastened together in this way, then other layers added and stitched over, the mat being approximately half an inch thick. Small fragments, much decomposed. Brown.

20.32.4. Matting. Ar. 1510 (S.D. 43–46).

Fragments of stems of grass or thin reed laid parallel and adhering (3–6) together. There is no indication of tie-bands and the bits are too small and decomposed to suggest the texture of the mat. Dark brown.

20.32.5. Reed Matting. Ar. 1449 (S.D. 58–61).

Bundles of fine reed, laid parallel, with thin tie-bands of single reed stems at irregular intervals. The material is too decomposed to determine the direction of these bands. Along part of the edge are fragments of a strong twisted band of reed stems which probably formed the border of the matting.

20.32.6. Fragmentary Remains. Ar. 1556 (S.D. 42–59).

Detached bits of reed or grass fibre. No indication as to how they may have been applied as matting or other material.

20.32.7. Fabric. Baqaria 14 (29 B.C. to A.D. 36).

Fragments, on one of which are two minute specks of gold foil, adhering to a resinous substance. The fabric is a plain weave of thick single yarns spun from reed (?) fibre. One bit of resin has adhering to it the remains of a light brown fabric of very open texture made of extremely thin flat strips of grass. It has the appearance of plaiting rather than weaving.

20.32.8. Fabric. Ar. 1511 (S.D. 41–66).

Two fragments of plaited or felted fabric. Remains of reed matting adhere to one surface. The fibre is extremely thin, untwisted, apparently grass, but too decomposed to determine structure. Also a bit of thread made of twisted grass fibre.

20.32.12. Grass Matting. Ar. 1517 (S.D. 41–67).

Many fragments. The grass is plaited under and over thin stems of reed which are hidden by the close interweaving of the grass.

43.34.1. Top Layer from Bed. Ar. 1466 (S.D. 37–48). Pl. XLIX, Figs. 4 and 5.

A mass, composed of several layers, 1 in. × ¼ in. thick. Some flat strips of reed intermixed. The weave is somewhat open in character and the yarns, of reed fibre, are little twisted. Due to the untwisting of the thread, some of them appear to be doubled. Other yarns are flat and entirely devoid of twist. The fabric is in a very decomposed condition.

43.34.2. Bottom Layer from Canopy. Ar. 1466 (S.D. 37–48). Pl. XLIX, Fig. 3.

Very small, irregularly shaped fragments composed of layers of fabric similar in structure to that from the "Top Layer of Bed." On one fragment a weave of finer texture made from thin and well-spun yarn can be seen. The edges of this bit show that the layers in it vary slightly in texture, but all appear to have been made from reed fibre yarns. The material is too decomposed to allow of dissection or any separation of the layers.

43.34.3. Canopy Matting. Ar. 1466 (S.D. 37–48).

Made of flattened reeds. There is no clear indication of how the small bundles were tied together. The lengths of fibre are short, very much broken and decomposed, and it is possible that the ties crossed at greater intervals than are represented by these fragments. There are a few stems at right angles to the parallel reeds forming the mat, but no regular cross-binding has apparently been aimed at.

43.34.9. "Striped Rope-work." Ar. 1466 (S.D. 37–48). Pl. XLIX, Fig. 1.

The "striped rope-work" is plaited reed. There is a "warp and weft," the latter strands going over and under alternate warps as in plain weaving or simple basket-making. It is perhaps of some interest to find that the same material was used both in the form of narrow strips for this purpose and as a finely shredded and twisted yarn in the simple woven material of this people. The whitish colour of the strands running in one direction is probably a result of oxidation deposit. It does not occur on the lower surfaces of the fragments.

43.34.5. Cloth. Ar. 1533. Pl. L, Figs. 1, 2 and 3.

Small masses made up of many layers of loosely woven fabric. The yarns are variable in diameter and in the amount of twist. There does not appear to have been any beating up of the weft and, in the few places where the structure of the cloth can be followed, the warp and weft are at right angles, as when woven. The yarns are of reed fibre, irregularly and loosely twisted so that many of them have the aspect of doubled yarns.

43.34.7. Matting. Ar. 1481 (S.D. 37). Pl. XLIX, Fig. 6.

Fragment of grass matting. The layers of flattened stems alternate in direction. The bundles have been fastened together by a double thread of reed fibre. Only one bit of this, ¾ in. long, is visible. From other holes in the matting the stitch appears to have passed under and over adjacent bundles.

43.34.8. Bronze Mirror. Ar. 1213A (Middle Kingdom).

Covered on one side with layers of fabric strips which have been wound over the edges of the mirror and across the other face. Here most of it has perished, but impressions of the first layer are well preserved in the incrustation on the bronze. The fabric is a plain weave, the weft having a greater diameter than the warp yarn. The material is reed fibre and is considerably stained by the decomposition of the metal.

General.

The yarns are made from reed fibre such as was used in other fabrics from Armant and in the earliest of the material from Mostagedda and other Badarian sites. It is, however, so utterly decomposed that any detailed diagnosis of it is extremely difficult and uncertain. It is certainly not linen or any bast fibre.

DESCRIPTION OF THE PLATES

Pl. and Fig. Nos.	*Diams.*	*Fundplatz*	*S.D.*	*Chadwick Museum No.*	*Description*
XLIX 1	8	1466	38–48	43.34.9	Striped ropework in plan.
„ 2	8	„	„	43.34.9	Edge of same at an angle.
„ 3	8	„	„	43.34.2	Fabric from "canopy"
„ 4	8	„	„	43.34.1	Fabric from bed.
„ 5	8	„	„	43.34.1	Flat strip of reed embedded in the same fabric.
„ 6	¾	1481	37	43.34.7	Matting.
L 1	8	1533		43.34.5	Fabric.
„ 2	8	„		43.34.5	Small compacted mass of same fabric
„ 3	8	„		43.34.5	"a" and "b" portions of the larger fragment of compacted layers.

T. M.

Plaster and Cosmetics.

By A. F. Hallimond, Esq.

1330. Plaster. Consists almost entirely of calcium carbonate, very similar to the other pure plasters examined (i.e. Roman, see *The Bucheum*, I, p. 181. See also Dr. Thomas's report below. O.H.M.).

1550. Malachite.

1481. Malachite.

1312. Galena.

1547. Limonite (hydrated oxide of iron) in films along the basal cleavage of atacamite. Atacamite (copper oxychloride) is a characteristic mineral from the weathered zone of copper lodes in desert regions. (A portion of the last specimen was powdered up in a mortar and applied to the face mixed with a little colourless petroleum jelly. The resultant stain was of a reddish-brown colour. It is therefore safe to say that the specimen was mistaken for, or used for the same purpose as, red ochre, and not in place of malachite. A sample of the powder and the mineral is at U.C.L. O.H.M.)

Deposit from a Stone Jar in Ar. 1466.

By Professor T. P. Hilditch.

We have made as exhaustive an examination as possible of the small deposit from a stone jar in Ar. 1466. We have been unable to isolate any material of a fatty nature from

the specimen, the bulk of which appears to be resinous in character. We have also been unable to detect any traces of characteristic decomposition products of fats such as we encountered in the other specimens on which we formerly published a note in *The Analyst*, May, 1933.

Feathers from Ar. 1492.

By Dr. P. R. Lowe.

I cannot identify the ornamental clutch from 1492; but of one thing I am certain, the feathers did not belong to an ostrich, for barbs and barbules are present in the form that would be expected in a flying bird. I should guess an ibis of some sort, or at any rate, a "water bird," such as heron, crane, etc.

Plaster from Ar. 1330.

By Dr. H. Dighton Thomas.

I have had some of the mortar (from the Old Kingdom wall at Armant) "washed" for micro-organisms, and have found in the washings some fairly well-preserved foraminifera (very small tests of one of the groups of the Phylum Protozoa). So it would seem that the mortar has not been subjected to kilning.

WOOD COFFINS

Date	Fundplatz	Size				Notes
		Lth.	*Width*	*Ht.*	*Th.*	
S.D. 37	1481					Traces
„ 73–77	1518		c 75			„
II–IV	1319	c 80	c 43	35		Mud joints 2–5 wide but interstices only 0.25–2 cm. Mud joints squashed in wet with fingers. Pl. X, fig 4.
II–IV	1332	100	40	20	4–5	
„	1336	107	55	35	3	
„	1352	110	45	115		
„	1354	120	70			
IV	1309A	160	50			Coffin inscribed
IV–V	1310	188	50	32	4	With coarse plaster. Corner on half a brick
IV–VI	1204B					„ fragments painted gesso
„	1313	182	55	18?	6–8	
V–VI	1330	107	45	35	3–5	Plastered in and out coarse white plaster
VI	1314	150	40	22		
VIII–X	1311	110	50	85		With Plaster
XII	1213A		45			„ painted gesso
„	„ B					„ „ „
„	„ C		c 40			„ „ „
„	„ E	160	40–45			„ „ „
„	„ F					
„	„ G					
„	„ J		45			With traces of plaster
„	„ K	155	45			
„	„ L					
„	„ M					
„	„ N					
„	„ O	155	c 40			
„	„ P	180	40			
„	„ Q	80 +	46			
Later	1301A	50	23	30		See p. 137

GESSO AND MISCELLANEOUS OBJECTS.

Object	Material	Size	Fundplatz	Date	Refs. in Text and notes	Illustrations	Distribution
		Lth. *Max. Wth.*				Φ XIII 6 & XLVIII / XLVIII 1–3 / XLV 1–3	△ XLVII 3 / „ 2 / „ 4
Model shield? (s)	Gesso	14·2 8·7	1466	S.D. 38–48	pp. 121–132	XLIV 3 / „ 2	Cairo 57565 / Ashmolean
„ „ (d)	„	8·8+ 5·7+	„	„ „		XIII 6	Yeovil
? ? (c)	„	21+ 13+	„	E.P. IV	pp. 133–134	XLIV 6 etc., etc.	„
Garment	Gazelle skin	40 30	1483	„			
Headdress?	Feathers	8+ 6·5+	1492	S.D. 39–67	p. 134	„ 4–6	Ashmolean
Bag	Basketwork	c 5 3+	1446	„ 42–67		„ 7	W.H.M.M.
Dog		c 118 *Diam.* c 47 *Th.*	1305	Arab?		„ 8	„
Bun	Emmer grains	6 2·5	1590	S.D. 76–77	p. 135	XLIV 4	„
		Length *Max. Wth.*					
Playing piece	Ivory	7+ 0·6	1572	Pre.	(Incised)	XLIV 5	Buried
2 „ pieces	„	c 5+ 0·6	„	„		XIII 4,	Toronto
„ „ „	„	10·5 0·5	„	„	p. 135	„ „	„
„ Frags. do.	„	c 8+ 0·5	„	„		„ „	Queens
Playing piece, rectangular	„	3·5 0·8	„	„		„ „	Toronto
2 Marbles (see list of stone objects on p. 48).	„		1489	S.D. 38–46		XLIV 5	Buried
Frag. playing piece	„	3+ 0·3	1510	„ 43–46		„ „	Toronto
Comb	„	7·5 1·5	1457	„ 35–53	p. 135	„ „	„
„	„	7·5 2·3	1461	„ 43–50		XIII 1	Queens
Wand	„	11+ 2·5	1438	„ 33–76		„ 2	Toronto
„	„	14·5 3·5	Pre.			„ „	„
Vase	„	11+ 4·0	1482	S.D. 41–63		„ „	„
Frags. of?	Bone	8·3 4·5	1547	„ 31–62	p. 135	„ „	Destroyed
„ „ „	Ivory	*Various*	1501	„ 80		„ „	„
„ „ „	„	„	1207			„ „	„
„ „ „ with engraved concentric circles	„	0·5+ 0·5 +	1209B	E.P. III (Bad.)?		„ „	Queens
Point	Bone	5·8 0·5	1554	Pre.			
Ring	Ivory	(*Diam.*) 2·1 (*Th.*) 0·4	1417	S.D. 36–47	p. 135	XLVI	Toronto
Frag.	Ostrich shell	4·5 2·5	1579	„ 35–80		XLIV 5	Queens
5 Bangles	Shell	(*Diam.*) c 6·3 (*Th.*) c 0·8	1403	„ 34–41		XIII 5	Toronto
2 Shells	Mutila Dubia	c 5 c 2	1313	Dyns. IV–VI			Ashmolean
2 „	Spatha Rubens	c 7 c 4	1599	S.D. 38–67			Buried
„ Shell	„ „ „	c 7 c 4	1461	„ 43–50			„
„ Model Hippopotamus	Mud (painted red)	c 7 c 4	1400	Pre.		XIII 2	„
Basket (sq.)	Wickerwork	5·3+ 5·2 (*Ht.*) 47 20	1566	S.D. 42–59			Queens
„ (circ.)	„	12 (*Diam.*) c 30	1471	„ 38?	p. 136	IX 3	Buried
„ Bed „	Wood and plaited reeds (?)	„ c 30 23 20+ 20+	1517	„ 41–67		IX 4	W.H.M.M.
„	Wood	80 84 ?	1511	S.D. 41–56	p. 135	IX 2	„
„	Wickerwork	100+ c 25	23	„			
„	„	Traces only	2	„	135 f		
„	Wood „	„ „	1466	„ 38–48	p. 136	XIV 6 IX 1	Ashmolean
„	Wickerwork	„ „	1520	Pre.			W.H.M.M.
			1595	„			Buried
			1473	S.D. 46			„
			1510	„ 43–46			„

For samples of fabric, matting, twigs, etc. brought home, see the reports of Mr. Midgley and Mr. Boodle on pp. 137–141. For resin, reports on pp. 96 and 138.

CHAPTER IX

THE OSTEOLOGY

REPORT ON THE HUMAN REMAINS

By J. Wilfrid Jackson, D.Sc., F.G.S. (Manchester Museum).

INTRODUCTION

THROUGH the kindness of Sir Robert Mond, the President of the Egypt Exploration Society, and the late Sir Henry Wellcome, Director of the Wellcome Historical Medical Museum, I was able to visit Egypt in the winter of 1931–32 and assist the staff of the Armant Expedition under the direction of Mr. O. H. Myers.

In addition to other work, including a study of the remains of sacred cattle from the Baqaria and Bucheum at Armant,[1] I undertook the investigation of the human remains excavated during the winter's work.

The following report is based on notes and measurements taken during the field-work of that season.

Material.

The greater part of the material examined consisted of some nineteen male and fourteen female adult crania and other remains from crouched or contracted burials belonging to Predynastic times. In addition to these, a few others were studied. These comprised: (a) a female cranium and lower jaw, together with a femur, thought to be of E.P. III (Badarian) age. This skeleton (from grave 1209A) was associated with a fœtus: (b) some male and female crania, lower jaws, and associated limb-bones, belonging to burials ranging from the Second to the Sixth Dynasties: and (c) two or three crania and other remains belonging to a late period.

Sex.

The sex of the skeletons was ascertained from a careful study of the cranial characters and checked in many cases by a close examination of the pelvis. There was no archæological evidence as to sex, and in a few cases the determination was rendered difficult owing to the effeminate character of the skeletons. Mr. Myers gave me great assistance in this work.

Preservation.

The state of preservation of the remains was, on the whole, good; but, in a few instances, breakages had occurred and the skull or pelvis had been too badly crushed to be of service.

[1] Already published. See *The Bucheum*, 1934.

Plan of the Work.

No facilities were available in camp for ascertaining the cranial capacities. All measurements were made by means of a craniometer and small callipers graduated in millimetres, and with a steel tape. The points of measurement on the crania are those in general use; viz. F. Flower's Ophyro-occipital length. L. Glabella-occipital length. B. Maximum parietal breadth. B′. Least frontal breadth. H′ Basio-bregmatic height. LB. Basion to nasion. S1. Arc, nasion to bregma. S2. Arc, bregma to lambda. S3. Arc, lambda to opisthion. S1′. Chord, nasion to bregma. S2′. Chord, bregma to lambda. S3′. Chord, lambda to opisthion. U. Horizontal circumference (over glabella). PH. Alveolar point to tip of anterior nasal spine. G′H. Nasion to alveolar point. GB. Breadth between lowest points on zygomatic-maxillary sutures. J. Bizygomatic breadth. NH′. Nasion to base of anterior nasal spine. NH.R & L. Nasion to lowest edge, right and left, of pyriform aperture. NB. Greatest breadth of pyriform aperture. O1′.R & L. Breadth of orbits, right and left. O2.R & L. Height of orbits, right and left. G1. Length of palate from point of spina nasalis posterior to alveolar point. G1′. — do. from base of spine. G2. Width of palate between inner alveolar walls at M2. GL. Basion to alveolar point. f.m.l. Length of foramen magnum (basion to opisthion). fmb. Greatest breadth of foramen magnum.

The various measurements and a number of indices are given in the Tables at the end of the report, and comments are made in the text.

The lower jaws and certain of the limb-bones, where available, were also measured and tabulated. Individual peculiarities in the crania, lower jaws, and limb-bones, were noted, and are included in the following pages or the Tables at the end. These comprised the condition and stage of development of the teeth, signs of caries, etc.; ossicles in the sutures; presence of epipteric bones; condition of the frontal, etc.

In several of the crania, both Predynastic and Dynastic, the maxillæ were noted to be more or less deeply impressed immediately below the infraorbital foramina, while in others this area was quite flat and even. The pits in some cases, especially in the Predynastic series, closely resemble the suborbital or lachrymal fossæ in skulls of deer and sheep. This feature is noted in the Table as " maxillæ deeply hollowed " or otherwise.

As it was not possible to bring home all the skulls and bones examined, I selected a few, which, on account of some particular feature, seemed worthy of preservation. Among the Predynastic examples, the skulls and lower jaws of Nos. 1466, 1470, 1471, 1477, 1487, 1583 and 1596 were brought away. No. 1466 was associated with the Gesso objects (see Mr. Myers's report on p. 121), and the lower jaws are remarkable for their great bi-gonial width; 1471 has dental caries in the lower jaw (1493 also had dental caries in the lower jaw); 1477 is a supposed eunuch upon which a special report is furnished (p. 158), in addition to my own remarks; 1487 is a very broad skull with a high cephalic index, apparently of an alien. The latter is not taken into account in the indices, but is reported upon separately by myself and by Dr. A. J. E. Cave.

The following Predynastic bones were also brought away:—1510, sacrum with the last lumbar vertebra attached; 1518, fused foot-bones; and 1591, sacrum attached to the left pelvic bone. These are reported upon separately.

Of the Dynastic series, the following were preserved: crania and lower jaws of 1304, 1323 (half skull only, and diseased femur), 1330 and 1336; also part of the cranium of 1310.

The cranium, lower jaws, and femur of supposed E.P.III (Badarian), p. 6, 1209A were also kept.

All the above are at the Wellcome Historical Medical Museum, but any may be claimed by the Egyptian Government after publication for the Anthropometrical collection at the Faculty of Medicine of the University, Qasr-el-Aini.

DESCRIPTION OF THE REMAINS.

In the course of this study use has been made of the following memoirs: "A Study of Egyptian Craniology from Prehistoric to Roman Times," by G. M. Morant (*Biometrica*, Vol. XVII, 1925, pp. 1 *et seq.*), and "A Study of the Badarian Crania," by Brenda N. Stoessiger (*Biometrica*, Vol. XIX, 1927, pp. 110 *et seq.*).

The Skulls.

The Predynastic Series.

When viewed from above (*Norma verticalis*) the majority of the Predynastic crania were found to be pentagonal in outline; three examples (1453, 1456 and 1482) were rather ellipsoid; four (1445, 1467, 1483 and 1590) were rather ovoid; and one (1487) was spheroid. The latter has a cephalic index of 80·9. In the following ranges of absolute dimensions and indices, skull 1487 has not been included as it is very broad and obviously alien. The full measurements of the skull are given in the Table, and remarks on the same follow the other Predynastic skulls.

The series of crania is, unfortunately, small, eighteen being male and fourteen female; but certain interesting comparisons may be made with those described by Morant, especially from Naqada (A & Q series) of Mid. (?) Predynastic date; Abydos, etc. (Early Predynastic); and El-Amrah, etc. (Late Predynastic).

The maximum length (L.), maximum breadth (B.), and basio-bregmatic height (H'.), ranged as follows:

			L.	B.	H'.
Armant.	Males.		173–201	124–143	120–140 mm.
		Mean.	179·8	132·9	133·3
	Females.		172–185	124–139	116–137 ?
		,,	178·7	130·7	129·5
Naqada.	Males.	,,	184·7	132·7	133·8
Abydos.	,,	,,	183·5	131·4	134·0
El-Amrah.	,,	,,	185·1	133·4	132·7
Badarian.	,,	,,	182·3	130·8	132·9
,,	Females.	,,	176·7	130·3	129·1

In L. the mean in the males of the Armant series is lower than that of the other four groups: in B. and H'. all the series agree closely.

The cephalic index (B/L.), the breadth-height index (B/H'.), and the height-length index (H'/L.) varied as follows:

			B/L.	B/H'.	H'/L.
Armant.	Males.		64·9–77·6	91·9–111·2	67·1–77·7
		Mean.	71·7	99·7	72·2
	Females.		68·5–77·2	91·8–113·9	67·4–77·5
		,,	72·5	100·6	72·1
Naqada.	Males.	,,	71·8	99·2	72·4
Abydos.	,,	,,	71·7	98·1	73·3
El-Amrah.	,,	,,	72·1	100·5	71·8
Badarian.	,,	,,	71·8	98·3	73·1
,,	Females.	,,	73·8	101·0	73·1

There seems to be very close agreement in all the groups.

In the Armant series, the relation of the breadth index (B/L.) to the height index (H'/L.) is as follows: Males. Of the total 18 perfect skulls the height index of 7 is less than the breadth index; in 7 cases the height index is distinctly greater; in 2 cases (1474 and 1483) the two indices are equal; in 1 case (1467) the height index exceeds the breadth index by ·6 mm. only; and in 1 case (1470) the height index is only ·6 mm. less than the breadth index. Females. Of the 14 skulls the height index of 5 is less than the breadth index; in 7 cases the height index is distinctly greater; in 1 case (1456) the two indices are equal; and in 1 case (1548) the height index exceeds the breadth index by ·5 mm. only. In the whole series there are 7 males and 5 females which are dolico-platycephalic, and in at least two of these (M.1445 and F.1557) the vault is very low.

In facial height (G'H.), facial breadth (GB.), and facial index (G'H/GB.) the ranges are:

			G'H.	GB.	G'H/GB.
Armant.	Males.		62–77	86–112	66·6–80·2
		Mean.	69·0	95·1	72·5
	Females.		59–72	83–103·5	65–83·7
		,,	66·8	92·0	72·7
Naqada.	Males.	,,	69·7	95·9	72·7
Abydos.	,,	,,	69·2	—	—
El-Amrah.	,,	,,	70·0	—	—
Badarian.	,,	,,	67·1	94·6	70·9
,,	Females.	,,	64·8	89·6	71·7

In facial height, facial breadth, and facial index, the Armant crania agree closer with the Naqada and Abydos series than with the Badarian group. In the latter, the face is a little shorter.

Morant (*op. cit.*, p. 9) gives the means in male Bantu Negroes as follows:

	G'H.	G'H/GB.
Zulu.	69·5	72·1
Angoni.	70·3	74·1
Kaffir.	69·1	72·2

These are almost identical with all the above except the Badarian group. As pointed out by Morant, from a comparison of facial measurements alone there is at least a distinct suggestion of negroid affinities in what has been called the Upper Egyptian race.

The bi-zygomatic (or facial) breadth (J.) shows the following range:

Armant.	Males.		117–138	Females.		111–128
		Mean.	126·7		Mean.	119·5
Naqada.	Males.	,,	125·9			
Abydos.	,,	,,	124·3			
El-Amrah.	,,	,,	127·0			
Badarian.	,,	,,	122·5	Females.	Mean.	117·7

L

The mean of the Armant series shows them to be wider across the face than the Badarian series, and to be nearer the three other, Predynastic, groups.

Comparing the facial height (G'H.) with the bi-zygomatic width (J.) the facial index (of Kollman) is as follows :

Armant.	Males.	49·2–59·2, with a mean of 54·4
	Females.	50·8–61·5, with a mean of 56·5

Collectively, the skulls are narrow- or long-faced (lepto-prosopic). Certain individual skulls are very long-faced, as 1583 (F.), 1456 (F.), 1466 (M.), 1590 (M.), 1483 (M.), and 1477 (M.). One male skull, 1473, is rather short- and broad-faced (index = 49·2) ; it is the shortest-faced in the males. The longest-faced in the males is 1466 ; the longest in the females, 1583.

The ranges of the nasal width (NB.), nasal height (NH.R.), and nasal index (NB/NH.R.) are :

			NB.	NH.R.	NB/NH.R.
Armant.	Males.		21–27	46·5–53·5	42·8–54·5
		Mean.	24·4	49·4	49·3
	Females.		19·5–28	42·51	44·7–59·7
		,,	24·1	47·3	50·9
Naqada.	Males.	,,	25·0	50·2	49·8
Abydos.	,,	,,	25·2	50·1	50·3
El-Amrah.	,,	,,	25·5	—	—
Badarian.	,,	,,	24·9	48·4	51·5
,,	Females.	,,	23·6	46·0	51·6
Bantu Negroes (ex Morant).					
Zulu.	Males.	,,	27·3	47·2	58·1
Angoni.	,,	,,	28·0	48·5	58·0
Kaffir.	,,	,,	27·3	48·6	56·3

In NB. the Armant skulls are very close to the Badarian and only slightly less than the three Predynastic groups. In NH.R. the mean is slightly higher than the Badarian and slightly less than Naqada and Abydos. In NB/NH.R. it is slightly lower than Badarian and near Naqada and Abydos. They have somewhat longer nasals than the Badarian and slightly shorter than Naqada and Abydos.

The means of the nasal index show the nasal skeleton in the Armant skulls to be moderate in width, or mesorrhine, as in the Badarian and the three Predynastic groups, the mean in the Armant and Badarian series being slightly higher in the female.

Individually, the nasal indices are interesting. In the Armant males, 6 are leptorrhine, 9 mesorrhine, 2 platyrrhine, and 1 on the border-line between mesorrhine and platyrrhine : in the females, 6 are leptorrhine, 1 mesorrhine, 6 platyrrhine, and 1 on the border-line of mesorrhine and platyrrhine. In one of the female skulls (1548) the nasal skeleton is very platyrrhine (index = 59·7).

In nasio-basial length (LB.) and basio-alveolar length (GL.) the ranges are as follows :

			LB.	GL.
Armant.	Males.		88–107	86·5–106
		Mean.	100·4	98·4
	Females.		93·5–105·5	88·5–106
		,,	99·4	96·3
Naqada.	Males.	,,	101·4	96·7
Abydos.	,,	,,	102·0	98·8
El-Amrah.	,,	,,	101·6	98·3
Badarian.	,,	,,	99·3	95·0
,,	Females.	,,	96·1	92·6

In LB. the Armant skulls are midway between the Badarian and the Naqada series : in GL. they are near the Abydos and El-Amrah groups, the mean being higher than the Badarian owing to the greater basio-alveolar length.

Though Flower's gnathic index (=relation of basion-nasion LB. to basion-alveolar GL.) deals only with two sides of the gnathic (nasion-alveolar-basion) triangle, it is regarded as useful to some extent, and is given here as a matter of interest. Taking all 32 Armant skulls, the mean of this index is 97·7 (=orthognathic) ; the mean of the 18 males is 98·1 (=just mesognathic), and of the 14 females 97·2 (=orthognathic). It will be noted that in the females the index is lower than in the males. The gnathic index of individual skulls shows that, in the males, 11 are orthognathic, 5 are mesognathic, and 2 are prognathic, viz. 1590 at 112·4, and 1490 at 105·5 ; in the females, 9 are orthognathic, and 5 are mesognathic. The index for 1590 is very high : there are no lower jaws with this skull, which is rather broad.

The range of the orbital index (O2/O1') is as follows :

Armant.	Males.		74·3–87·1
		Mean (17)	82·4
	Females.		77·5–89·6
		,, (14)	84·5
Naqada.	Males.	,, (57)	82·4
Badarian.	,,	,, (33)	83·3
,,	Females.	,, (20)	83·4

In the Armant males the orbits are microsemic, as in the Naqada series : in the females they are mesosemic. Further notes on the shape of the orbits are given in the Table.

The length of the palate (G1), the width of the palate (G2), and the palatine index (G2/G1) show the following ranges :

			G1.	G2.	G2/G1
Armant.	Males.		50·0–63·5	37·5–47·0	61·4–81·1
		Mean.	57·8 (16)	40·3 (18)	70·5 (16)
	Females.		51·5–59·0	32·0–42·5	59·2–77·2
		,,	55·7 (12)	38·4 (14)	68·5 (12)
Badarian.	Males.		45·8–59·8	34·6–41·1	65·2–85·4
		,,	51·2 (34)	37·8 (30)	75·0 (30)
	Females.		44·0–55·0	34·2–40·6	64·0–81·5
		,,	48·8 (18)	36·5 (17)	74·5 (15)
Naqada.	Males.	,,	52·5 (49)	40·7 (48)	77·5 (48)

In the Armant skulls the palate is longer than in the Badarian and Naqada series, and wider than in the Badarian group, but agreeing with Naqada. The mean of the palatine index is less than in the Badarian and Naqada groups.

It will be noticed that in the female crania of Armant and Badari the length, width and index are smaller.

In one Armant female, 1583, the palate is very narrow, viz. 32 (index, 59·2) ; while in three males it is rather wide, viz. 1590=47 (index, 80·3), 1482=43 (index, 81·1), and 1483=45 (index, 76·2).

Notes on the mandibles associated with the Predynastic skulls.

The following mandibles were measured : Males, 15 ; females, 11 ; and dimensions will be found in Tables C. and D. at the end of the report. These bones showed some variation, irrespective of sex. In some the chin was decidedly pointed, in others, square. The sigmoid notch was wide and shallow in all but two, viz. 1448 and 1557, both female. In the latter, the

ramus was higher than in any of the others. On the whole, the ramus tended to be broad. The depth of the symphysis in front varied from 27 to 39 mm. in the whole series, the mean of the males being 33·5, and of the females 31·4. The deepest symphysis occurred in 1466, viz. 39 mm. This jaw also showed other interesting features. There was slight eversion of the angle in 9 males and 4 females. In one jaw, 1454 (male) the angles were inverted. The width between the angles varied as follows: Males, 82 to 104; mean, 93·6: females, 81·5 to 94·5; mean, 86·6. The widest was in mandible 1466 (viz. 104), which also possesses the deepest symphysis and shallowest sigmoid notch.

Notes on the supposed eunuch, 1477, *of Predynastic date.*

The following notes were made on the skeleton of 1477 during field-work. Humeri, distal ends united to body; proximal ends loose; fossæ perforated. Radii, proximal and distal ends loose. Ulnæ, proximal end united; distal ends loose. Femora, proximal head just united; great trochanter loose; lesser trochanter loose; distal end loose; platymeric and somewhat carinated. Tibiæ, proximal end loose; distal end just united; somewhat platycnemic; squatting facet faint; external proximal surface curved. Fibulæ, proximal and distal ends loose. Ossa innominata, male features; immature. Sacrum, immature, but anchylosed together.

The skull is very long (cephalic index=68·4) and high-headed (H′/L.=73·8), almost the longest and highest of the males. The face is very long (G′H/GB.=80·2), the longest of the males, except 1466. The nose is narrow (NB/NH.R.=42·8), the most leptorrhine of the series. The orbits are round (O2/O1′R.=74·3), the most microsemic of the series. As regards the teeth, the left M_3 has not been cut, the right M_3 just cut; others worn.

The lower jaws have a square chin, a wide sigmoid notch; the breadth of the ramus is 35 mm.; the vertical depth below coronoid is 68·5; the depth of the symphysis is 34·5. All the teeth are present and are good and worn; the canines and incisors are crowded.

The full dimensions of the skull and lower jaws are given in the Tables A. and C. at the end.

Note on the Predynastic male skull, 1466.

This skull is somewhat broad (cephalic index=75·5) and rather low-headed. Viewed from above (*Norma verticalis*) it is pentagonal in outline. It is longer in the face than any of the other male skulls. The nasals are mesorrhine (index=50·9). The orbits are rounded and mesosemic, with a higher index (=87·1) than any of the other skulls. Owing to the spina nasalis posterior being broken, it was not possible to obtain the full length of the palate. The length was therefore taken from the base of the spine and was 58; the width of the palate was 39. The upper jaw is prominent. All the teeth are cut and worn.

The lower jaws are wider between the angles (=104) than any others examined. The external depth of the symphysis is also greater than in any of the others, being 39 mm. The chin is square and the sigmoid notch wide and very shallow. All the teeth are present, good and worn. The incisors project slightly forward.

This skull has been submitted to Dr. A. J. E. Cave, who has given a report in the Appendix.

Notes on the alien Predynastic male skull No. 1487.

As already mentioned, among the Predynastic skulls there was one of a very different type from the others. On account of its general appearance, it was regarded as alien and not belonging

to the usual Predynastic Egyptian type. The measurements of this skull and of the accompanying mandible are given in Tables A. and C. The skull is very wide at the parietal eminences, being 149 mm., and has a maximum length of 184, giving a cephalic index of 80·9=brachycephalic. It is low-headed, having a basio-bregmatic height of 135 mm. Viewed from above (*Norma verticalis*) the skull is spheroid. The face is orthognathic, the gnathic index being 93·5, and on the border-line between short and long-faced forms, the facial index (of Kollman) being 51·9. The nasal index is 48·0=mesorrhine. The orbits are squarish and microsemic (index 80·2). The palate is wide, with an index of 75·4. In the mandible, the chin is square in front, the sigmoid notch wide, the breadth of the ramus is 33 and the height from the coronoid 66·5, the depth of the symphysis is 31, the intergonial angle 95: the angles are slightly everted. All the teeth are present, good and well-worn. Two of the limb-bones were preserved for examination, a humerus and a tibia. The humerus is not perforated at the coronoid fossa. The tibia has a full length of 389 mm., giving an approximate height of the individual of 5 ft. $7\frac{1}{4}$ in. It shows some torsion; very little platycnemia (index 74·1); the external condylar surface at the proximal end is curved; and the lower anterior articular (or squatting) facet is present.

Some further notes on the above skull are given in an appendix by Dr. A. J. E. Cave, of the Royal College of Surgeons, to whom the skull was sent recently. Dr. Cave agrees as to its alien origin and refers to it as "Armenoid". It is of interest to recall that Sir Grafton Elliot Smith found definite evidence of alien (Armenoid) admixture among the people of Egypt in Early Dynastic times (see *Ancient Egyptians*, 1911, pp. 95 *et seq.*).

Notes on the Predynastic limb-bones.

The femora, tibiæ, and humeri, of a number of the Predynastic skeletons were examined and special points noted.

The femora of 11 males and 6 females were measured. All belonged to skeletons of which the skulls have just been considered. In the males the full lengths ranged from 414 to 477, with a mean of 445·9, giving a stature of about 5 ft. 5 in.—the mean height of Sir Grafton Elliot Smith's Proto-Egyptians (*The Ancient Egyptians*, 1911, p. 49). In the females, the lengths ranged from 404 to 450, with a mean of 426·1, giving a stature of about 5 ft. 1 in. All the bones were slender and exhibited platymeria, or flattening of the upper end, as well as pilastre, or carination. In addition to the above, a few unsexed femora were also examined in which platymeria was not so apparent. One example, 1511, was remarkable for its length, being 502 mm. over all, giving a stature of about 5 ft. 9 in. Unfortunately, no skull was obtained with this.

Of the tibiæ, 11 males and 4 females were measured, in addition to a few unsexed examples of which the skulls were not obtained. All exhibited some form of lateral flattening of the bone (platycnemia), this being more marked in the males than in the females. In the males, the index of platycnemia ranged from 55·3 to 74·2, with a mean of 66·1; in the females, the index ranged from 68·9 to 75·0, with a mean of 71·2. The male tibia, 1593, with an index of 55·3, was very platycnemic. The posterior border of the external condylar surface at the proximal end of the tibiæ showed slight to moderate curves; and the distal end, in all examples except 1474, possessed the squatting facet to a greater or lesser extent. One or two of the bones showed some torsion. In the males, the full lengths ranged from 355 to 408, with a mean of

380·4; in the females, the lengths were from 338 to 385, with a mean of 357·5. The longest tibiæ in the males, 1590 at 408; 1595 at 406, and 1470 at 395, also had long femora, viz. 476, 476 and 477 respectively. One unsexed example, 1511, belonging to the previously mentioned femur, had a full length of 412, giving an estimated stature of 5 ft. 9½ in. This tibia was not platycnemic, but had a lower anterior articular (squatting) facet.

Of the humeri, the following were studied: 15 males, 8 females, and several unsexed. The majority had a perforated coronoid fossa, either the right or left side, or both. The lengths varied from 310 to 338 in 8 males, and 286 to 298 in 2 females. Owing to damage, the full lengths could not be taken in all cases. In humerus 1590 (associated with the long femur and long tibia) the coronoid fossa was not perforated; in 1595 (also with long femur and long tibia) the left side only was perforated and the bone was twisted and muscular with a length of 333 mm.; in 1470 (also with long femur and long tibia) both humeri were perforated, the lengths of the bones being 338—the longest of the series.

The tendency to pilastre and platymeria of the femur, platycnemia of the tibia, and perforation of the coronoid fossa of the humerus, has been noted by Sir Grafton Elliot Smith among Proto-Egyptian skeletons (*op. cit.*, pp. 50 and 58).

Notes on the E.P.III (Badarian) human remains.

The skeleton of a female with fœtus was found in grave 1209. The skull is somewhat imperfect and very light and fragile, with a length of 174 mm. and a breadth of 129 mm., giving a cephalic index of 74·5. It is impossible to ascertain the height owing to damage. The face is long; the nose moderate in width (mesorrhine); and the orbits are microseme. The full dimensions of the skull are given in Table B and of the mandible in Table D at the end of this report.

The limb-bones are light and fragile. The femur has a full length of 424 mm., giving a stature of about 5 ft. It is slender with slight carination.

Notes on the human remains of Dynastic date.

The remains belonging to burials of later date than Predynastic consist of a few male and female skulls with accompanying lower jaws and limb-bones of Second to Sixth Dynasty date; a male and two female skulls and other remains of Late date; and a male skull, etc., of possibly Roman date. They are too few in number for the purpose of statistical study, but, for future use, the dimensions obtained in the field are given in Tables E and F at the end. Some further notes are given below.

Skulls of Second to Sixth Dynasties:

1304. A female skull of Second to Fourth Dynasty; long and narrow; high-headed; orthognathic; face long; nose leptorrhine; orbits mesoseme; palate long. The accompanying femur shows slight carination and platymeria, and measures 436 mm. in full length, giving a stature of about 5 ft. 4¼ in.

1336. A male skull of Second to Fourth Dynasty; a little broad; low-headed; strong superciliary ridges overhanging nasion; just mesognathic; face long; nose mesorrhine; orbits microseme (index 75·0); palate long. The femur is platymeric, with strong and rough carination, and a full length of 440 mm.= 5 ft. 4½ in. in stature. The tibia measures 382 mm.; the external condylar surface is curved; the distal end shows a trace of the squatting facet; slightly platycnemic.

1354. A male skull of Second to Fourth Dynasty; long and narrow, but low-headed; face fairly long; nose leptorrhine; orbits round and deep, just megaseme (index 89·4); palate fairly long.

This skull is very prognathic, the index GL/LB yielding 119·5.

The femur measures 480 mm., giving a stature of 5 ft. 7½ in.; the carination is moderate; platymeric; heavy, some torsion.

1335. A male skull of Fourth (?) Dynasty; long and high-headed; orthognathic; face long; nose leptorrhine; orbits mesoseme; palate fairly long.

The femur measures 490 mm.=5 ft. 8¼ in. in stature; carination strong and rough; platymeric. The tibia is 413 mm. long; the external condylar surface is well curved; squatting facet present; very little platycnemia.

1308. A female skull of Fifth Dynasty; rather broad; high-headed; orthognathic; face long; nose leptorrhine; orbits mesoseme; palate fairly long.

1330. A male skull of Fifth to Sixth Dynasty; long, with the height equal to the breadth; orthognathic; very long-faced; nose leptorrhine; orbits round and microseme; palate long.

The femur measures 446 mm.=5 ft. 5 in. in stature; platymeric; moderate carination. The tibia is 387 mm. in length; the external condylar surface is slightly curved; no squatting facet; no platycnemia.

1352. A male skull of Fifth to Sixth (?) Dynasty; long and narrow; high-headed; orthognathic; face long; nose leptorrhine; orbits microseme.

1314. A male skull of Sixth Dynasty; rather broad; low-headed; orthognathic; face long; nose mesorrhine; orbits very megaseme (index 98·5); palate fairly long.

The femur measures 388 mm., giving a stature of about 5 ft.; it is small and slight, with moderate carination and slight platymeria.

1313. A male skull of Fourth to Sixth (?) Dynasty; rather broad; high-headed; very orthognathic; face long; nose very leptorrhine; orbits microseme; palate short.

The femur measures 446 mm., giving a stature of 5 ft. 5 in.; platymeric; strong carination; some torsion. The tibia is 380 mm. long; the external condylar surface is slightly curved; no squatting facet; platycnemic.

1302. A female skull of Late date; long and high-headed; orthognathic; face long; nose leptorrhine; orbits rounded and mesoseme; palate short.

The femur measures 412 mm., giving a stature of 4 ft. 8¼ in.; slender, with slight carination and platymeria.

1305. A male skull of Late date; long and high-headed; orthognathic; face long; nose mesorrhine; orbits mesoseme; palate short.

The femur measures 469 mm., giving a stature of 5 ft. 6¾ in.; platymeric; moderate carination; strong torsion.

1303. A male skull of (?) Roman date; long and narrow; high-headed; orthognathic; face long; nose leptorrhine; orbits rounded and microseme; palate short.

The femur measures 432 mm., giving a stature of 5 ft. 4 in.; slender, with slight platymeria and carination.

J. W. J.

Appendix

By Professor A. J. E. Cave

1466 Ar. (*Pre.* 38–48). The complete skull of an elderly adult (? male) with the coronal, sagittal and squamo-parietal sutures obliterated. A full complement of teeth was present at death in both jaws, the molars and premolars especially manifesting considerable wear : no dental caries or alveolar disease : an incisor edge to edge " bite " present. Orbits with arched upper border and marked lateral prolongation of their infero-lateral corners ; incisor and canine fossæ very pronounced. Slight post-coronal depression and a marked sagittal furrow.

Racial characters. Though somewhat broader than the typical Predynastic cranium (especially in the bi-parietal diameter) this skull appears to be truly African. Its general build, features and dimensions are matched by crania of the Mesolithic people of Kenya, from Bromhead's site, Elementeita.

No obvious " Armenoid " traits are present, although the possibility of some racial admixture is not thereby totally excluded.

1487 Ar. (*Pre.* 35–36). A complete adult skull, presumably male, free from any pathological trait, from an individual aged about forty to fifty years. Marked brachycephaly ; squarish orbits, horizontally disposed ; high nasal bridge ; full complement of teeth in both jaws, and all, save the third molars, very severely worn, due to admixture of grit (sand) in the food. Mandible with wide and stout ascending ramus, disposed at right angles to the body of the bone.

Racial characters. This skull does not appear to be African at all : it is totally unlike the Predynastic Egyptian type and is certainly *not* that of a Negro. Its characters are matched most closely by skulls (ancient and modern) from Asia Minor, i.e. Syria, and the Arabian Peninsula. This specimen must be referred to an Asiatic origin, as one of the brachycephalic " Armenoid " type, which appears in the Nile Valley in increasing numbers in the time of the Old Kingdom, and which, from being an alien strain, ultimately became a well-recognised Egyptian type (*vide* the portrait statues, etc., of the Pyramid Age and Middle Kingdom).

I cannot recall any reference to this " Armenoid " strain appearing in Egypt prior to the Protodynastic period, but intercourse between the Nile Valley and the Red Sea certainly obtained from the very earliest times, and the individual represented by this skull may well have been an Asiatic trader or settler in Egypt.

It matters little what description is applied to this cranium—" Mesopotamian," " Syrian," " Armenoid," have all been employed to designate this particular Asiatic type, though perhaps the last term is the most preferable.

TABLE A

INDIVIDUAL MEASUREMENTS OF MALE PREDYNASTIC SKULLS FROM ARMANT, UPPER EGYPT

Grave	*Lengths.* F.	L.	B.	B¹.	H¹.	L B.	*Arcs.* S1.	S2.	S3.	*Chords.* S1¹.	S2¹.	S3¹.	U.	*Face.* PH.	G¹H.	GB.	J.	*Nose.* NH.R.	NH.L.	NB.	*Orbits.* O1¹. R.	O1¹. L.	O2. R.	O2. L.	*Palate & Profile.* G1.	G1¹.	G2.	GL.	*Foramen.* f.m.l.	f.m.b.
1400	180	183	131	93·5	137	107	125	123	115	111	110·5	99	508	18·5	67	92	129	49·5	48·5	23·7	41	41	31	32	56	51	38	98·5	36	30
1445	180	179	139	99	125	88	136	127	113	113·5	110·5	89	513	18?	67	94	123	48	48·5	27·5	34	33	29·5	30·5	51·5	46·5	38	86·5	31·5	25
1454	183	183	130	88	132	103	132	126	114	114	114	96	505	21·5	69	100	127	50	50	25	37	37	30	30	60·5	53	42	99·5	32·5	28
1466	182	184	139	93	135	99	134	128	110	117	113·5	93	524	27	77	97	130	53	53	27	39	37	34	34·5	—	58	39	99	38	32·5
1467	174	175	135	89·5	136	94	126	132	110	111·5	115	95	503	19·5?	66	96	124	48	48	23	35	35	30	30	50	45	38·5	88	35	26
1470	192	192	130	93·5	129	103·5	125	132	120	107	116	94	523	20	68	89·5	125	51	51	24·5	38	37	33	34	63·5	56	39	102	36	31
1471	194	194	126	92·5	137	102	130	135	130	112	122	101	528	20	64·5	95	128	47	47	25	37	37	29	30	61	54	39	103	33	29
1473	186	186·5	129	92	137	99·5	132	139	112	114·5	123	93	513	18·5	62	93	126	46·5	46·5	23	37	34	31	32·5	52	47	40	95	38	29
1474	192	195	138	92	138	105	131	135	122	114	122	97·5	530	—	—	93	123	49·5	49·5	27	37	35	32	32	—	—	37·5	100?	35	27
1477	184·5	185·5	127	89·5	137	104	129	136	122	114	122	97	512	24	69	86	117	49	49	21	39	36	29	29	57·5	52	38·5	100	36	27·5
1482	183	183	131·5	88	140	105	130	133	113	112	119	98	513	23?	71	98?	132	50	49	24	37·5	37	32	32	53	49	43	94·5	35	31
1483	182	184	134	93·5	134	102	122	130	135	108	114	108	512	22	74	100	126	51	51	26	39	39	32	32	59	54	45	99·5	32	28
1490	187	188	135	90·5	131	99·5	130	140	115	113	122·5	97	512	25	69	98	129	47	46	25	38	36·5	31	31·5	57	52	42	105	38	28
1493	188	188	141	91·5	134	104	140	125	127	119	113·5	106	526	26	72	92	128	49·5	49·5	22	38·5	36	31·5	31·5	60	55	40	101	37	33
1518	200	201	143	90·5	137	98·5	141	145	138	123·5	129·5	108·5	560	29	75	112	138	49	50	25·5	—	—	31	31	63·5	55·5	43	96·5	38	33
1590	174	176	134·5	100	128	88·5	132	122	107	114·5	110	94·5	510	22	70	92	125	50	50	26	37	35·5	30·5	31·5	58·5	53·5	47	99·5	38·5	28
1593	170	173	126	85	120	100	115	122	105	102	109	87	491	21	66·5	92	123	49	49·5	25	40	38	32	32	59	51	38	98	35·5	28·5
1595	186	187	124	97	134	105	129	147	113	113	130	96	522	19	69·5	93·5	128	53·5	53·5	25·5	39·5	39·5	33	33	63	55	39	106	34·5	28·5
1487	183	184	149	97	135	101·5	133	130	114	116	115	101	527	20	68	97	131	52	51	25	38	35	30·5	3·05	57	51	43	95	36	28·5

Grave	*Indices.* B/L	B/H¹	H¹/L.	B—H¹ L.	G¹H/GB.	NB/NH.R.	NB/NH.L.	O²/O1.¹R.	G²/G1.	*Remarks.*
1400	71·5	95·6	74·8	—3·2	72·8	47·7	48·8	75·6	67·8	Orbits somewhat rectangular; L.M3 not cut, all others worn; sagittal suture closed.
1445	77·6	111·2	69·8	7·8	71·2	44·8	44·3	86·7	73·7	Orbits round; maxillæ hollow; all teeth cut and worn; skull somewhat broad at parietal eminences.
1454	71·0	98·4	72·1	—1·0	69·0	50·0	50·0	81·0	69·4	Orbits round; maxillæ flat; all teeth cut and well worn; L.M2 and 3 lost and alveoli closed; coronal and sagittal closed, also part lambdoid; grooved along sagittal line.
1466	75·5	102·9	73·3	2·1	79·3	50·9	50·9	87·1	—	Orbits round; maxillæ slightly hollowed; prominent jaw; all teeth cut and worn; coronal and sagittal almost closed.
1467	77·1	99·2	77·7	—0·0	67·7	47·9	47·9	85·7	77·0	Orbits round; maxillæ slightly hollowed; R and L.M.3 not cut, others well worn; sutures distinct but closing at obelion.
1470	67·7	100	67·1	0·5	75·6	48·0	48·0	86·8	61·4	Orbits round; maxillæ flat; all teeth cut and worn; sutures distinct; prominent occiput.
1471	64·9	91·9	71·1	—5·6	67·8	53·2	53·2	78·3	63·9	Orbits round; maxillæ slightly hollowed; all teeth cut and worn; sagittal closing; prominent occiput.
1473	69·1	94·1	73·4	—4·2	66·6	49·6	49·6	83·7	76·9	Orbits round; maxillæ slightly hollowed; all teeth cut and well worn.
1474	70·7	100	70·7	—0·0	72·0?	54·5	54·5	86·5	—	Orbits round; maxillæ slightly hollowed; all teeth cut and worn; sagittal closing; prominent occiput.
1477	68·4	92·7	73·8	—5·3	80·2	42·8	42·8	74·3	66·9	Orbits round; maxillæ slightly hollowed; L.M3 not cut, R.M3 just cut, others worn; sutures distinct and frilly.
1482	71·8	93·9	76·5	—4·6	72·4?	48·0	48·9	85·3	81·1	Orbits round; all teeth cut and worn; sagittal closing; epipteric bone on right side.
1483	72·8	100·0	72·8	—0·0	74·0	50·2	50·9	82·0	76·2	Orbits somewhat square; maxillæ flat; some molars lost and alveoli closed; sagittal closed; wide, shallow depression over crown behind coronal suture.
1490	71·8	103	69·6	2·1	69·4	53·1	54·3	81·5	73·6	Orbits round; maxillæ slightly hollowed; all teeth cut and well worn; hinder half of sagittal closed.
1493	75·0	105·2	71·2	3·7	78·2	44·2	44·2	81·8	66·6	Orbits round; maxillæ flat; all teeth cut and well worn; sagittal closing behind.
1518	71·1	104·3	68·1	2·9	67·0	52·0	51·0	—	67·7	Orbits squarish; maxillæ flat; some molars lost and alveoli closed, others well worn; very prominent occiput; sagittal closing; ossicles in lambdoid; foramen magnum near centre.
1590	76·4	105·0	72·7	3·7	76·0	52·0	52·0	82·4	80·3	Orbits squarish; maxillæ slightly hollowed; all teeth present, good and worn; sutures distinct, simple.
1593	72·8	105·0	69·3	3·4	72·2	51·0	50·5	80·0	64·4	Orbits squarish; maxillæ hollowed; teeth well worn, some lost; sagittal closing.
1595	66·3	92·5	71·6	—5·3	74·3	47·6	47·6	83·5	61·9	Orbits round; maxillæ flat; R.M3 not cut, others good and well worn; sutures open, large ossicles at and near λ; rather prominent occiput.
1487	80·9	110·3	73·3	7·6	70·1	48·0	49·0	80·2	75·4	Orbits squarish; maxillæ moderately hollowed; all teeth cut and well worn; sutures rather simple.

TABLE B

INDIVIDUAL MEASUREMENTS OF FEMALE PREDYNASTIC SKULLS FROM ARMANT, UPPER EGYPT

Grave	*Lengths.* F.	L.	B.	B^1.	H^1.	LB.	*Arcs.* S_1.	S_2.	S_3.	*Chords.* S_1^1.	S_2^1.	S_3^1.	U.	*Face.* PH.	G^1H.	GB.	J.	*Nose.* NH.R.	NH.L.	NB.	*Orbits.* O_1^1. R.	O_1^1. L.	O_2. R.	O_2. L.	*Palate and Profile.* G_1.	G_1^1.	G_2.	GL.	*Foramen.* f.m.l.	f.m.b.	*Indices.* B/L.	B/H^1.	H^1/L.	B—H^1. L.	G^1H/GB.	NB/NH.R.	NB/NH.L.	O_2/O_1^1.R.	G_2/G_1.	*Remarks.*
1407	172	172	126	86	116	95	113	125	106	101·5	116·5	91	482	24	65	90	114·5	45·5	45·5	25·5	36	35	31	32	58	51	39	96	34	25·5	73·2	108·6	67·4	5·8	70·2	56·0	56·0	86·1	67·2	Orbits round ; maxillæ deeply pitted ; all teeth cut and worn ; sutures distinct.
1448	184	182	129	95·5	(137)	(105)	125	135	112	109·5	121	96	501	17	59·5	91·5	(117)	42	42	19·5	37	37	31·5	31·5	51·5	46·5	37	(99)	33	28·5	70·8	(94·1)	(75·2)	(—4·3)	65·0	46·4	46·4	85·1	71·8	Orbits round ; maxillæ flat ; R. and L. M_3 not cut, others worn ; sutures distinct.
1453	179	181	126	89	129	99	122	125	108	107	112	90	498	23	68·5	88	121	47	47	23	36·5	37	31·5	31	56	51	36	99·5	33·5	27	69·6	96·8	71·3	—1·6	77·8	48·9	48·9	86·3	64·2	Orbits somewhat square ; maxillæ hollowed ; all teeth cut, some well worn ; sagittal closing ; long ossicle at junction of coronal and sagittal ; flattened at lambda ; prominent occiput.
1456	179	179	130	90	130	100	127	125	121	108	113	102	505	27	71·5	102	122	47·5	47	26	36	35	32	33	57	51	38	98·5	30·5	27	72·6	100	72·6	—0·0	69·9	54·7	55·3	88·8	66·6	Orbits round ; maxillæ flat ; R. M2 and 3, L. M_3 lost and alveoli closed, others well worn.
1475	185	185	137	92	127	96	127	127	122	107	115	98·5	505	22	68·5	94	118·5	49	49	26	37	35·5	29	30	54	51	39	92·5	34·5	26·5	74·5	107·9	68·6	5·4	72·8	53·0	53·0	78·3	72·2	Orbits round ; maxillæ flat ; R. M_1 lost and alveolus closed, others well worn ; prominent occiput ; sutures distinct, ossicles in lambdoid, epipteric on left.
1492	180	180	128	93	134	98·5	132	132	110	111·5	118	93·5	501	19·5	69·5	94	121	51	51	23	39	37	31	32·5	59	55·5	40	95·5	33	26	71·1	95·5	74·4	—3·3	73·9	45·0	45·0	79·5	67·8	Orbits round ; maxillæ flat ; all teeth cut and well worn ; sutures very distinct.
1501	185	185	131	94	136	101	135	133	113	115	120	96	515	23	68	103·5	128	49	49	23	36·5	35·5	32·5	32·5	57	51	42	99	36	29·5	71·3	96·3	73·5	—2·7	65·6	46·9	46·9	89·1	73·6	Orbits round ; maxillæ flat ; all teeth cut and well worn ; coronal and sagittal closing, ossicles in lambdoid.
1538	182	181	124	87	135	101	129	133	110	111·5	117	91	483	22	62	83	111	45·5	46	25	36	35	31	32·5	54	51	32	95	34	26	68·5	91·8	74·5	—6·0	74·7	54·9	54·3	86·1	59·2	Orbits round ; maxillæ flat ; all teeth cut and worn ; sutures very distinct.
1548	180	178	133	96	134	103	124	130	108	107	115	90	500	22	65	99	127	47	46	28	38·5	38·5	34·5	34·5	58	53·5	40	100	32	28	74·7	99·2	75·2	—0·0	65·6	59·7	60·8	89·6	68·9	Orbits squarish ; maxillæ flat ; all teeth cut and worn ; sutures very distinct, ossicle at λ.
1557	180	180	139	95	122	96	123	137	116	110	123	93	514	24	70	91·5	122	51	51	27·5	37·5	37·5	33	32	55	48	42·5	90·5	34	30	77·2	113·9	67·7	9·4	77·7	53·9	53·9	88·0	77·2	Orbits squarish ; maxillæ hollowed ; back teeth both sides lost and alveoli closed ; coronal and sagittal almost closed.
1566	179	178	128	89	121	98·5	115	132	117	100	117	93	497	23·5	65	89	117	46	44·5	26	40	37·5	31	31	—	(47·5)	39	95·5	33·5	26·5	71·9	105·7	67·9	3·8	73·0	56·5	58·4	77·5	—	Orbits round ; maxillæ hollowed ; all teeth cut and worn ; coronal and sagittal almost closed.
1569	179	178	125	89·5	131	105·5	122	127	116	106	112·5	96	501	20·3	66·5	87	118	48	47	21·5	37	36·5	32	32	—	52	40	106	33	26·5	70·2	95·4	73·6	—3·3	76·4	44·7	45·7	86·5	—	Orbits squarish ; maxillæ flat ; all teeth cut and well worn ; sutures distinct ; large ossicle in right lambdoid.
1583	179	179	137	90	126	93·5	126	121	125	108	109·5	98	508	24	72	86	117	49·5	49	23	37	34	31·5	31	55	49	35	88·5	32·5	32·5	76·5	108·7	70·4	6·1	83·7	46·4	46·9	85·1	63·6	Orbits squarish ; maxillæ flat ; R. and L. M_3 not cut, others well worn ; sutures distinct ; large ossicle at λ and small one in L. lambdoid.
1596	174	174	128	90	135	100	129	123	117	112	111	98	490	21	64·5	90	120	45·5	45	21	37	36	29	29	55·5	48	39	93·5	35	26	73·5	94·8	77·4	—4·0	71·6	46·1	46·6	78·3	70·2	Orbits round ; maxillæ hollowed ; R.M_3 not cut, others well worn ; sutures distinct.
1209A	172	174	129	85·5	—	—	120	130	105	105·5	114·5	94	476	23·5	70	84	(116)	48	48	24·5	—	39	32	31·5	—	—	35·8	—	—	—	74·1	—	—	—	83·3	51·4	51·4	O_2/O_1^1L. 80·7	—	Orbits ovate and inclined downwards at outside ; maxillæ flat ; all teeth cut, good and well worn ; R.I2 displaced ; all sutures distinct ; skull light and fragile.

TABLE C

INDIVIDUAL MEASUREMENTS OF MALE PREDYNASTIC MANDIBLES FROM ARMANT, UPPER EGYPT

Grave.	*Chin.*	*Sigmoid notch.*	*Breadth of ramus.*	*Vertical depth below Coronoid.*	*Depth of Symphysis.*	*Width between angles.*	*Remarks (Teeth).*	
1445	Square	Wide	28·0	63·0	32·5	—	Slightly everted angle.	Teeth all present, good and well worn.
1454	Somewhat pointed	do.	37·5	56·0	33·0	82·0	Angles inverted.	Left M2 absent and alveolus closed. Left M3 just erupted; right M3 not cut. Others well worn.
1466	Square	Wide and very shallow	33·0	62·0Ca.	39·0	104·0	Slightly everted.	All present, good and worn. Incisors slightly forward.
1467	do.	Wide	27·5	64·5	30·5	90·0		M3 not cut both sides. Others good and well worn.
1470	Slightly pointed	do.	35·5	65·0	30·0	90·5		All present, good and worn.
1471	Square	do.	38·0	67·0	33·0	97·0	Everted.	All present and well worn. Caries under right M1.
1473	do.	do.	30·0	61·5	34·5	91·0	Slightly everted.	M3 not cut both sides. Others good and worn.
1474	do.	do.	30·0	64·5	36·0	94·0	Everted.	Left M3 not cut. Others fairly good and well worn.
1477	do.	do.	35·0	68·5	34·5	—		All present, good and worn.
1482	do.	do.	30·0	63·5	33·0	91·0		do. do.
1483	do.	do.	32·5	72·0	36·0	97·0		Left M3 not cut; others good and well worn.
1490	do.	do.	29·5	66·5	34·5	87·5		All present, good and worn.
1493	do.	do.	35·0	70·0	35·0	99·0		M2 absent both sides and alveoli closed. Others worn. Caries under left M1.
1593	Rather pointed	do.	31·5	53·5	27·0	100·0	Slightly everted.	All present and well worn.
1595	Square	do.	33·5	63·0	34·0	94·0	do.	do. do.
1487	Square	Wide	33·0	66·5	31·0	95·0	Slightly everted	All teeth present, good and well worn.

TABLE D

INDIVIDUAL MEASUREMENTS OF FEMALE PREDYNASTIC MANDIBLES FROM ARMANT, UPPER EGYPT

Grave.	*Chin.*	*Sigmoid notch.*	*Breadth of ramus.*	*Vertical depth below coronoid.*	*Depth of symphysis.*	*Width between angles.*	*Remarks (Teeth).*
1448	Somewhat pointed	Rather narrow	32·5	57·5	28·0	86	M_3 not cut both sides; others good and worn.
1453	do.	Wide	30·0	—	30·5	82	Teeth all present and worn.
1456	do.	do.	35·5	62·5	33·0	94·5	Right M_1 and left PM_2, M_1, M_2, absent and alveoli closed; others well worn.
1475	do.	do.	27·0	56·5	29·5	81·5	All but right M_1 present (latter shed and alveolus closed); incisors thrown forward; all worn.
1492	Pointed	do.	33·0	54·5	32·5	89·0+	Slightly everted angles — All present, good and well worn.
1538	Somewhat pointed	do.	33·0	61·0	29·5	87·5	Everted — do. do. do.
1548	do.	do.	34·5	63·0	33·5	85·0	do. do. do.
1557	—	Narrow	31·0	76·0	—	—	Slightly everted — Old jaw; most teeth lost and alveoli closed.
1566	Rather pointed	Wide	26·0	56·5	35·0	81·5	do. — All present, good and worn.
1583	do.	do.	31·0	67·0	31·0	89·0	do. do.
1596	do.	do.	33·0	61·5	32·0	90·0Ca.	do. do.
E.P. III (" Badarian ") 1209A	Pointed	do.	30·0	56·5	30·0	82·5	Slightly everted — R. PM_2 absent and alveolus closed; other teeth good and worn.

TABLE E

INDIVIDUAL MEASUREMENTS OF DYNASTIC SKULLS FROM ARMANT, UPPER EGYPT

Grave	Date.	Sex.	*Lengths.*						*Arcs.*			*Chords.*			U.	*Face.*				*Nose.*			*Orbits.*				*Palate and Profile.*				*Foramen.*	
			F.	L.	B.	B^1.	H^1.	LB.	S_1.	S_2.	S_3.	S_1^1.	S_2^1.	S_3^1.		PH.	G^1H.	GB.	J.	NH.R.	NH.L.	NB.	O_1^1. R.	O_1^1. L.	O_2. R.	O_2. L.	G_1.	G_1^1.	G_2.	GL.	f.m.l.	f.m.b.
1304	II–IV	F.	186	186	136	91·5	139	105	130	130	113	110	118	95	515	23·5	75	98?	129·5	53	52·5	24	38·5	37·5	33	33	61·5	55	40	97·5	36·5	31
1354	,,	M.	187	190	138	89	127·5	97	125	140	114	111·5	124	94	520	24	75·5	99	130	53	53	25	38	38	34	34	57·5	51·5	40	106	34·6	26·5
1336	,,	M.	178	184·5	139	93·5	136·5	106	126	134	112	112	115·5	95·5	514	22	68·5	97·5	135	47·5	47·5	23·5	42	40	31·5	31·5	63·5	57	39	104	36	30
1335	IV (?)	M.	187	189	137	88·5	139	101	132	133	122	116	117·5	104	512	19·5	67·5	92·5	123	51	50	22·5	40	39	34	35	60	54	41	96	40	32·5
1331	IV	M.	187	190	136	87·5	131	103	125	132	117	113·5	117	94	522	—	—	—	132?	—	—	—	—	—	—	—	—	—	—	—	34·5	27
1323	IV–V	M.	193	195·5	(144)	(96)	—	—	(132)	(135)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1308	,,	F.	175	175·5	136	90	139 ?	102·5	122	136?	102	105·5	119?	90·5	492	17	67	99	128·5	52·5	52·5	24·5	37·5	37·5	32	33	56	50	37·5	97	33	27·4
1352	V–VI (?)	M.	183	184	130	89	141	105	133	143	102	113	122·5	86	512	21	71	91	130	53·5	53·5	25	40	40	33	33	—	—	45	98	39	30
1330	V–VI	M.	189	192	137	92	137	105	125	146	115	110	127	98	519	26·5	76·5	92	122	53·5	53·5	23	38·5	37·5	31	32	62	55	38	99	34·5	27·5
1314	VI	M.	172	172	133	87	130	90	133	121	109	111·9	107·5	91·3	480	(13)	62	90	114	50·5	50	24·7	35	35	34·5	34·5	50·5	45·5	34	84	35	28·5
1313	IV–VI (?)	M.	176	178	136	86	142	105·5	128	122	117	114	110	103	497	(12)	65	89·5	126	52·5	52·5	22	38·5	37·5	31	32	50	47	35	91	29	29·5
1307	Late	F.	187	186	140	94	136	106·5	142	122	111	120	111·4	93·5	520	—	—	—	—	—	—	—	—	—	—	—	—	—	38	—	37	30
1305	,,	F(?)	183	185	136	96	141	98	145	127	116	124·5	115	97	511	22	73·5	96·5	132	52	52·5	25·5	40	40	34	34	57	50·5	39·7	91	36·5	30
1302	,,	F.	183	183	127	88·5	131	101	125	134	113	107	121	91·5	497	19	66	92	121·5	49	49	23	36	36	31·5	32·5	53	49	38·5	93·5	36	28
1303	Rom.?	M.	177	178	125	85·6	135	100	126	132	104	111	115	90	490	16	63·6	89	120	49·5	48	22·5	37·3	37·3	31	31	53	49·5	39	95	36	29·5

Grave	*Indices.*										*Remarks.*
	B/L.	B/H^1.	H^1/L.	(B–H^1) L.	G^1H/GB.	NB/NH.R.	NB/NH.L.	O_2/O_1^1R.	G_2/G_1.		
1304	73·1	97·8	74·7	—1·6	76·5	45·2	45·7	85·6	65·0		Orbits rounded ; maxillæ slightly hollowed ; all teeth cut, good and well worn ; sutures distinct ; ossicle in L. lambdoid (near mastoid) ; inion prominent.
1354	72·6	108·2	67·1	+5·5	76·2	47·1	47·1	89·4	69·5		Orbits round and deep ; maxillæ flat ; R. and L. M_1 lost and alveoli closed, others well worn ; coronal and sagittal closing.
1336	75·3	101·8	73·9	+1·3	70·2	49·4	49·4	75·0	61·4		Orbits rounded ; maxillæ hollowed ; L. PM_2, M_1 and 2 lost and alveoli closed, others well worn ; sagittal closing.
1335	72·4	98·5	73·5	—1·0	72·9	44·1	45·0	85·0	68·3		Orbits rounded ; maxillæ flat ; all teeth cut and well worn ; sagittal closing behind.
1331	71·5	103·8	68·9	+2·6	—	—	—	—	—		Orbits rounded ; coronal and sagittal almost closed ; lambdoid forced open.
1323	73·6?	—	—	—	—	—	—	—	—		All teeth cut, good and well worn ; coronal and sagittal closing.
1308	77·4	97·8	79·2	—1·7	67·6	46·6	46·6	85·3	66·9		Orbits rounded ; maxillæ flat ; R. and L. M_3 not cut, others well worn ; sutures distinct.
1352	70·6	92·1	76·6	—5·9	78·0	46·7	46·7	82·5	—		Orbits squarish ; maxillæ flat ; all teeth cut, good and well worn ; coronal closing.
1330	71·3	100	71·3	0·0	83·1	42·9	42·9	80·5	61·2		Orbits round ; maxillæ hollowed ; all teeth cut, good and well worn ; sutures distinct.
1314	77·3	102·3	75·5	+1·7	68·8	48·9	49·4	98·5	67·3		Orbits round and deep ; maxillæ hollowed ; L.M_3 not cut, R.M_1, 2, 3, lost and alveoli closed ; sutures faint.
1313	76·3	95·7	79·7	—3·3	72·6	41·9	41·9	80·5	70·0		Orbits rounded ; maxillæ flat ; most of teeth lost and alveoli closed ; coronal and sagittal closed ; inion prominent ; spine at opisthion.
1307	75·2	102·9	73·1	+2·1	—	—	—	—	—		Orbits broken ; sagittal almost closed ; inion prominent.
1305	73·4	96·4	76·1	—2·7	76·1	49·0	48·5	85·0	69·6		Orbits rounded ; maxillæ slightly hollowed ; all teeth cut and well worn ; coronal and sagittal faint ; inion prominent.
1302	69·4	96·9	71·5	—2·1	71·7	46·9	46·9	87·5	72·6		Orbits rounded ; maxillæ slightly hollowed ; all teeth cut and well worn ; coronal and sagittal almost closed ; rather prominent occiput.
1303	70·2	92·5	75·8	—5·6	71·4	45·4	46·9	83·1	73·8		Orbits rounded ; maxillæ slightly hollowed ; all teeth cut, good and well worn ; sutures distinct.

TABLE F

INDIVIDUAL MEASUREMENTS OF DYNASTIC MANDIBLES FROM ARMANT, UPPER EGYPT

Grave.	*Date.*	*Sex.*	*Chin.*	*Sigmoid notch.*	*Breadth of ramus.*	*Vertical depth below coronoid.*	*Depth of symphysis.*	*Width between angles.*	*Remarks (Teeth).*
1304	II–IV	F.	Rather pointed	Wide	34	64	36	84·5	All present, good and worn.
1336	do.	M.	Square	—	—	—	33·5	—	Broken All present, good and worn.
1335	IV?	M.	Rather pointed	Wide	33·5	69·0	34	87	do. do.
1331	IV	M.	Somewhat square	do.	33·0	66·5	30Ca.	—	Back teeth lost through age and alveoli closed.
1323	IV–V	M.	Square	do.	34·0	75·0	33·0	—	Everted All present, good and well worn on L. side; rest of jaw missing.
1308	do.	F.	Pointed	do.	37·0	65·0	29·5	94	Everted All present, good and worn.
1352	V–VI?	M.	Square	do.	34·0	69·0	32·5	—	do. do.
1330	V–VI	M.	do.	do.	34·5	58·0	33·0	96	Everted do. do.
1314	VI	M.	Pointed	do.	28·0	55·0	23·0	85	L.M_3 not cut; R.M_1, R.I_1, L.I_1, absent and alveoli closed; others worn.
1313	IV–VI	M.	Square	do	33·5	62·0	29·0	92·5	All present, well worn; incisors crowded.
1307	Late	F.	Pointed	do.	32·0	64·5	—	—	Everted Damaged.
1302	do.	F.	Square	do.	30·0	55·5	26·5	91·0	All present, good and worn.
1303	do.	M.	Rather pointed	Shallow	32·0	—	29·5	92·0	Everted All cut, some lost, remainder well worn; caries under R.M_2.

CHAPTER X

THE PATHOLOGY

Report on the Bones of a Suspected Eunuch (Predynastic) Ar. 1477

By Professor John Cameron, M.D., D.Sc.

The skull gave a maximum glabella-occipital length of 188 mm. (approx.), and a maximum parietal breadth of 131·5 mm. The cephalic index was 69·9, so that the skull was markedly dolichocephalic. It was observed that the mastoid processes were unusually large and rough, even for a male skull, while the muscle markings on the occipital bone were well shown. The posterior half of the skull thus displayed well-recognised male characters. The frontal and facial portions were, judged by European standards, more female in appearance. Thus the frontal bone was small and narrow ; there were no superciliary ridges ; the upper orbital margins were sharp ; the orbital apertures had a rounded outline ; the orbits were close together, the inter-orbital width being only 22 mm. But comparison with even a short series (12) of Early Dynastic Egyptian skulls which had been sexed as male on the evidence of the whole skeleton, showed that these characters are not uncommon among males of the period to which the skull belonged. No " eunuchoid " significance can therefore be attached to them.

There was no flattening of the occipital bone between the protuberance and the foramen magnum, such as has been described by Gall and Möbius as existing in the eunuch skull. It should be added that the existence of this character has been challenged by Rieger.

All the teeth had erupted except the third molars of the upper jaw.

The limb-bones of this skeleton displayed a eunuchoid appearance.

The Femur had the characteristic smooth slender rod-like shaft, with absence of bowing, pilastering and other evidences of muscular activity. The epiphysis for the lesser trochanter was missing, thus suggesting an age of sixteen years. There was slight platymeria. The maximum length of the femur was 455 mm., which denoted an individual about 5½ ft. in height. This would have been an average stature for an Ancient Egyptian of *adult* age. According to Möbius[1] the rapid growth of the limbs of a eunuch, castrated in infancy, does not begin to manifest itself until puberty—say about the thirteenth or fourteenth year. This individual, already tall for his years, had at least four more years of growth, seeing that the epiphysis at the lower end of the femur does not normally fuse with the shaft until the twentieth year. It must be admitted, of course, that the immaturity of this individual did complicate matters a bit. There can be no doubt, however, that if he had attained adult age he would have been a tall individual. Möbius[1] refers to the 6-ft. stature of the eunuchs of modern Egypt.

A tibia (right) minus the lower epiphysis measured 375 mm. It was platycnemic.

[1] *Die Wirkungen der Kastration*, Halle, 1906.

A fibula (right) was devoid of both epiphyses, but it measured as much as 349·5 mm. It was very slender, and had the characteristic, straight rod-like shape of the eunuch bone.

A humerus (left) measured 317 mm. It was straight and rod-like, with a remarkably smooth slender shaft. It possessed a supratrochlear foramen. The lower epiphysis was fused (sixteenth–seventeenth year in the modern bone). The epiphysis for the internal condyle was missing (fuses at eighteenth year). The upper epiphysis was still separate (fuses at twentieth year).

A radius (right) was devoid of both epiphyses, and measured 228 mm. It also had the characteristic rod-like shape with consequent loss of the lateral curvature.

An ulna (right) devoid of lower epiphysis measured 256·5 mm.

The sacrum was small. The innominate bones were small with smooth surfaces. Their epiphyses were missing. When the pelvis was articulated it was noted that the outline of the pelvic brim was somewhat triangular in shape, as in the male. Becker[1] has shown that the eunuch pelvis exhibits no tendency to manifest female characters.

I have examined the literature on eunuchs in two British, two German, one Italian and two French anatomical and anthropological journals and have been unable to find any references that were really helpful. The only description of Ancient Egyptian eunuchoid bones I could find is one by myself,[2] but even in that case I was not definitely certain that the individual in question was a eunuch.

In the present instance, the immaturity of the individual makes me hesitate in expressing a definite opinion, but some of the appearances shown by the skull and the limb-bones suggested eunuchoid characteristics, although the evidence on the whole is slight.

Appendix.

Since the above report was written Miss Tildesley has found a hitherto undescribed eunuch skeleton in the R. C. S. Museum. It is that of a negro of advanced years (age unknown). The skull of this agrees with that under discussion by displaying the same female characters when viewed from the front. These are—a small narrow frontal bone, no superciliary ridges, sharp upper orbital margins and rounded orbital apertures.

The posterior half also agreed with the skull under discussion in displaying *male* characters, namely rough mastoid processes and prominent muscle markings on the occipital bone.

The pelvic brim in both instances shows the characteristic male outline.

The epiphysial lines can still be seen on the limb-bones.

The humerus (361 mm.), radius (300 mm.) and the ulna (312 mm.) are unusually long and slender and smooth—the characteristic eunuchoid appearance.

The metacarpals and phalanges of the hand are elongated and slender.

The humeri of this eunuch skeleton and the humerus under discussion possess supracondyloid foramina.

The femora of this eunuch skeleton are very long. The right measures 505 mm., giving a stature of 1836·3 mm. (69½ in.). These femora are bowed and pilastered, but the pilaster is remarkably smooth and polished and is quite unlike the rugged edge of the normal pilastered femur.

[1] *Der männliche Castrat*, Freiburg-i-B., 1898.
[2] *Manchester Univ. Museum Handbook*, No. 68, 1910.

The tibiæ (462 mm.) and the fibula (438·5 mm.) are also remarkably long, smooth and polished.

The metatarsals and the phalanges of the toes are elongated, but not so much as in the case of the fingers.

Male Skull and Femur from Ar. 1310 (Fourth to Fifth Dynasty).

This collection consists of a fragment of calvaria, fragmentary superior maxillæ and mandible and right femur. The skull is that of an adult male, as shown by the superciliary ridges and the strong muscle markings on the occipital. Maximum (glabella-occipital) length 195·5 mm. The glabellar region is present, but merely the inner ends of the superciliary ridges, which are comparable with those of the modern European male. The temporal lines are situated very high on the parietal bone, so that the interstephanic breadth must have been unusually small, thus indicating a large temporal muscle. An interesting fact is that the fossa for the reception of the left occipital pole of the brain is deeper than that on the right side. This pointed to a larger left hemisphere and therefore a right-handed individual.

The maxillæ are orthognathic. The mandible shows a well-marked mental protuberance which is comparable with that of the modern European mandible. The teeth show no special features, apart from wear.

Femur. The head and most of the neck are missing. The remainder has a length of 437 mm., thus suggesting a femur above the average ancient Egyptian length. There is well-marked bowing and torsion. The bowing is directed both anteriorly and laterally. There is slight platymeria, but the index for this cannot be estimated owing to the presence of a large exostosis. Strangely enough, this is almost exactly in the position of that found on the femur of Pithecanthropus. This bony outgrowth is purely pathological and has no racial significance. The trochanters and the gluteal ridge are rough for muscular attachment. The linea aspera is rough and slightly pilastered. The patellar groove is deep. The outer edge of the patellar articular surface is bevelled off by the action of the quadriceps tendon, indicating vigorous muscular activity in the region of the knee-joint. The facet on the internal condyle is continued upwards so far posteriorly that it reaches the posterior aspect of the femoral shaft. This shows that the individual had habitually adopted the squatting posture when at rest.

J. C.

Report on Predynastic and Early Dynastic Bones from Armant.

By Dr. A. J. E. Cave.

(*Assistant Conservator, Royal College of Surgeons of England*).

Ar. 1323 (*Fourth to Fifth*)

The imperfect skull of a male not under fifty years old, comprising left half of cranium, left maxilla and the mandible.

The skull is dolicocephalic, with a maximum length of 190 mm. Its characters (of brow slope, contours, occipital bossing, moderate sub-nasal prognathism) agree very well with Neolithic material from British and African (Kenya) sources.

The maxillary sinus is capacious ; the palate high and unconstricted ; the nasal aperture wide. At the time of death a full complement of teeth existed, of which there now remain in situ the left maxillary molars and premolars and the left mandibular molars and second premolar. These teeth are all healthy and well formed : there is no trace of caries, alveolar abscess or other disease. The crowns show great wearing, especially those of the premolars and first molar in both jaws, wherein the enamel has been quite eroded.

The facial bones appear to contain more animal matter than do those of the vault, due possibly to the effects of fire heat, evidence of which, in the shape of burning and actual charring, is very obvious in the left half of the mandible and in the left temporal region. The apex of the (left) mastoid process has broken away (? due to this heat), exposing the large mastoid air cells.

The specimen shows nowhere any pathological lesion.

Ar. 1323 (*Fourth to Fifth*). A right femur, lacking the head, the upper third much obscured by the wax and plaster employed in the repair of post-mortem comminution. The conformation of the condylar articular region, and the general build of the bone, suggest a robust individual of good muscular development and a full range of movement at the knee joint. The normal antero-posterior curvature of the shaft is perhaps exaggerated in the lower part of the bone ; a distinct lateral curvature (or bowing) is evident in the upper half of the shaft. There is no reason to regard this specimen as in any way abnormal : it is not pathological, and its features fall well within the normal range of femoral variation. The bone is presumably that of an adult male.

Ar. 1593 (*Pre.* 73–76). An adult right femur, with head and lower extremity repaired with plaster. A shorter, less massive bone than the preceding, not deformed, and manifesting no pathological change. Its general shape is peculiar, owing to an excessive and unusual degree of platymeria. This flattening of the front of the shaft affects profoundly the upper half or more, resulting in the production of an obtrusive ridge or crest upon the medial aspect of the bone. This crest, separating anterior from posterior surfaces, may be traced from the root of the neck to the top of the medial supra-condylar ridge. The trochanters (including an incipient third trochanter), the linea aspera and the condyles are in no way abnormal. Beyond this extreme platymeria the bone exhibits nothing of note.

Ar. 1593. (*Pre.* 73–76.)

An adult left tibia from a tall individual.

There is nothing pathological about this bone—no sign of disease, no old fracture. Its curious shape seems due to the marked platycnemia present, which renders the anterior margin of the bone less sinuous than the normal, in the upper third of the shaft, and accounts for the obliteration (in the same region) of the customary concavity on the antero-lateral surface of the shaft. The evidence of the lower end of the tibia shows the individual to have been a " squatter." There are vigorous muscular markings.

Both bones agree in showing the anatomical features characterising Neolithic man in a marked degree. The femur shows the most obtrusive condition of platymeria I have ever seen, and the tibia's manifestation of platycnemia is extreme. The real reason for either of these two conditions is not known, but the relative theories are discussed by Professor Cameron in *The Skeleton of British Neolithic Man* (London, 1934).

Ar. 1591. (*Pre.* 68–78.)

The greater part of a sacrum and left innominate bone from an adult female subject, showing sacro-iliac synostosis.

The sacrum is of normal anatomical constitution : it exhibits some pathological change in the nature of osteophytic lipping of the upper border of its first vertebra. The innominate bone (lacking the pubic element) is well formed and of definite female type : the acetabulum is free from any evidence of hip-joint disease. At the (left) sacro-iliac joint there is pathological bony union between sacrum and ilium. This may have been produced by " rheumatism " (i.e. infective or metabolic disease) or may have been consequent upon trauma to the sacro-iliac joint, but there is no definite evidence forthcoming whereby to settle this point. In view of the osteophytic lipping of the upper sacral region, this sacro-iliac synostosis may be regarded as part of a general senile change involving the ossification of various ligaments, particularly those of the axial skeleton.

Ar. 1510. (*Pre.* 43–46.)

The complete sacrum of an adult to which the fifth lumbar vertebra is ankylosed.

The sacrum is normal, consisting of the usual five vertebræ, and shows no sign of fracture, malformation or disease. Its characters suggest the female sex. The last (fifth) lumbar vertebra is present in all its parts, and the intervertebral fibro-cartilage between it and the sacrum has persisted, though somewhat compressed, up to the time of death. The lumbar transverse processes have assumed sacral characters, and the right-hand process has undoubtedly effected union with the ilium : fusion has taken place between the last lumbar and the first sacral transverse processes, and this at some period after birth, the condition being definitely acquired and not congenital. This sacralisation of the fifth lumbar has deprived the last intervertebral disc of much of its normal function ; this disc had been reduced to about one-third its usual depth in the mid-line, whilst laterally it had practically disappeared (especially on the left), allowing contiguity of the lower aspect of the fifth lumbar and the upper surface of the first sacral vertebræ.

There is a very slight tilting upwards of the fifth lumbar in its left moiety.

The sacralisation of the fifth lumbar would have no demonstrable effect during life : this condition occurs not uncommonly, and in the vast majority of cases is merely an anatomical variation, quite devoid of symptoms or sequelæ.

Ar. 1518. (*Pre.* 75–77.)

Portion of skeleton of an adult left foot : the third metatarsal is lacking.

The intertarsal and tarso-metatarsal joints have suffered severely from an osteo-arthritis, which has ankylosed all the bones present into a rigid mass devoid of intrinsic mobility.

The shaft of the second metatarsal exhibits a globular enlargement, the site of an old healed fracture of this bone.

A. J. E. C.

PART II

THE PREDYNASTIC SETTLEMENT

CHAPTER XI

EXCAVATION

Position. The settlement lay in the very edge of the cultivation " in that little strip of herbage strewn, that just divides the desert from the sown." Its exact position can be seen on the map in Pl. II.

Discovery. It was discovered in the winter of 1929–30, when bricks were being made for the construction of Bucheum House. While digging for the clay the brickmakers found some pottery and flints and, as it was at once apparent that these came from a settlement and that there were some unusual features about the finds, the owner was persuaded to obtain the material for the bricks elsewhere. Investigation of the site was postponed until the winter of 1930–31.

Excavation. The excavation of the site was carried out by myself, assisted by Fairman and Shaw and occasionally Baly, though the major part was done by Shaw and myself. Shaw carried out the survey. Subsequently Dr. Jackson gave us much valuable help in sorting and arranging the material.

The methods employed were similar to those fully described by Miss Caton-Thompson in *Bad. Civ.* and need not be recounted here. Certain factors made the field work less complicated, though they sometimes increased the difficulties of interpretation. The chief of these was the lack of any visible stratification in the material. The deposit was a mixture of dust, ash and vegetable matter, to all appearances completely *mélangé*, but the presence of flints in groups, a stone structure and a group of shells, appeared to preclude any possibility that it was not *in situ*. So puzzling was the nature of the deposition and of the material obtained that we wrote for assistance to Mr. Guy Brunton. Mr. and Mrs. Brunton very kindly came to visit us, accompanied by Mr. Reginald Ross-Williamson and Miss Eileen Buchanan. They saw the site, the method of working and the material, and Mr. Brunton has been kind enough to read through this report.

Another feature differentiating our own work from that at Hemmamieh was the flatness of the site, which made it possible to level down from the surface in the simplest manner with a metre rod. The error on this method was in the neighbourhood of ± 2 cm.

Two sections were worked, numbered 1,000 and 1,100 respectively. Where not otherwise stated, the reference is to 1,000. Section 1,100 was so disturbed that no valuable contribution could have been obtained by careful levelling in that area. Its chief interest lay in the large pots

found *in situ* which confirmed the impossibility of the area being merely detritus washed down from a higher level.

The settlement was first lightly scraped to clear away all obviously loose and disturbed objects which were numbered 1,000 and kept separate from the levelled material. A few late Roman graves, numbered between 500 and 600 on the plans, which were discovered during this process, were next cleared, and any Predynastic material from their filling was numbered 1,000. The tombs were dated by a few decayed beads, notably an eye bead from 538. The area was then covered with a grid of 2-metre squares, which had to be extended as further areas were opened up. Section 1,100 has a 4-metre grid. (See the general plan on Pl. LXXV.) The top two levels were 10 cm. each in depth, and the lowest level was irregularly variable, being generally less than that in depth, e.g. III.K.8 was of 5 cm. deep. In expanding the area, the letters J–C were added unnecessarily, but they have been retained so as to avoid the confusion and error which is always apt to arise in renumbering a large series of objects.

The area was not exhausted to the west and its extent in that direction is not known. The area which was dug for brickmaking lies between 1,100 and 1,000.

Objects were all numbered according to their level and square, and when, for any reason, a doubt arose about any particular object, this was marked simply 1,000. It is important, of course, to know the relative horizontal positions of objects as well as the vertical, in case the settlement may have grown horizontally rather than vertically, a habit which may be observed among the simpler (so-called Bedouin) villages on the desert edge to-day, and has been found at Ma'adi.

The general deposit gave no indication of stratification, but groups of flints and a stone structure, as well as a group of shells, were obviously *in situ*. In 1,100, large pots were found *in situ* and the same must have been the case with the larger of the anciently-broken " B " pots brought up by the brickmakers, Pl. LII, top third. There is only one possible alternative to the hypothesis that the settlement was originally on the site in which we found it. Had there been two settlements, one on the present site and one on the neighbouring spur above, and had heavy rainfalls at frequent intervals during the occupation of the site washed away the lighter deposits from the lower settlement and redeposited those from the higher in their place, the state of affairs found might have been brought about. Such an explanation, however, is so improbable in itself that it need not be given serious consideration. Moreover, were it the case, it would give broadly the same resultant stratification as if the deposits had been laid down consecutively in the same area. Subsequent rainfalls would reverse the stratification but would not leave groups of shells, flints, etc., *in situ*, or place pots upright.

Plans and Charts. Pl. LXXV gives the general lay-out of the site and the plan of 1,100, and Pls. LXXVI to LXXVIII give the plans of the different levels with the positions of the objects when significant. Pp. 258A, B and C are the registers of the materials found, laid out exactly like the plans, each rectangle showing the material that was found within the equivalent square of the plan. The types of pottery are given in the top left-hand corner, with the sequence dates, where known, opposite them, in the top right-hand corner. A pot and its date underlined, indicates that sufficient material was found to reconstruct graphically the entire form. In the centres of the squares below the pottery are the pottery objects other than pots, and opposite to them miscellaneous objects. In the bottom left-hand corner are the flint types. *Phi* (ϕ) opposite an object means that it is shown in a photograph, *delta* (Δ) that there is a line drawing

of it, and (A) that it is discussed technologically. A † in the centre of the square means that there was evidence of Roman disturbance other than a grave in that square. The graves have been ignored for reasons stated below (p. 169), but their positions can be seen on the plans. Photographs and drawings of the objects are on Pls. LII to LXIX. As objects numbered 1,000 and 1,100 do not appear on the large registers, which are arranged according to place of finding, a list of those which are anywhere figured or described is added here :

1,000

Natural stone like a crocodile (Φ)
Copper pin (Φ Δ)
Pottery human breast (Φ)
,, bulls, 2 (Φ)
,, spindle whorl (Φ)
,, frag. boat (Φ)
3 re-used sherds (Φ)
Frag. " R " pot with suspensory holes (Φ)
" B " ware (A) " R " ware (A).

Pots B18, O, p, q, (all Φ Δ) Pot P14d (Φ Δ), Pot B62e (Δ)

1,100

Natural sandstone cup (Φ)
Frag. inscr. lstne. (Φ Δ)
,, shell bangle (Φ Δ)
2 Pottery bulls (Φ)
Spindle whorl (Φ) from *madowa*.
Re-used sherd (Φ)
9 " D " ware (4A) (Φ)
3 Relief sherds (1A) from *madowa* (Φ)
6 " T " ware (1A) (Φ)
8 " R " ware (2A) (Φ)
Sherds of P23(A), P24(A), P11(A), L7f(A), L46, P(A) R33b, R(A)
Pots " T " ware 1092–1094 (T1, T2a, T2b) (all Δ)

CHAPTER XII

THE POTTERY.

The Wares. All the wares usual to Predynastic settlements were found, but with a notable paucity of " W." (buff or grey-green stoneware with wavy ledge handles) and " C." (softish brown ware with a polished red coating[1] and white decoration). There was possibly a larger proportion of the finer to the rough pottery than is usual in a village site.

The three almost complete " Black-topped " pots (B18 o–q, Pl. LII., Pl. LIV., Fig. 1) are noticeably more worn than any from the cemeteries.

Two exceptional wares deserve notice. A quantity of fragments of the Badarian " Smooth-brown " wares (*Bad. Civ.*, p. 21) was found. This distinctive pottery is a soft ware, polished less brightly than the usual Predynastic wares, and brown in colour, frequently with a black top—(" B.B.") " Black-topped brown." The finish is often sufficiently distinctive to be differentiated from the normal Predynastic, even when the colour is red (" P.R." " Polished-red "), and this may be due to the absence of any coating. It is well-known in Middle Egypt, where it is one of the main features of the Badarian culture, which is Early Predynastic III in date there. Another feature of this culture, the keel, also occurs frequently at Armant (Pl. LIV., Fig. 3), often in pots made of the above wares. Some fragments could be typed to forms given in the *Bad. Civ.*, Pls. XII–XVII. Some of the sherds marked " S.B." (" Smooth-brown ") in the charts may well have come from pots that were " B.B. " (" Black-topped brown ").

Another unusual find among the ceramics was the number of sherds from bowls with a point-burnished pattern in the interior. One complete pot of this type was found by the brick-makers (Pl. LIV., Fig. 2, and Pl. LII, Pl. 4d). The design might well represent an open lotus, but it is impossible to be certain with only one complete specimen. The remaining fragments of this ware are extremely small and give little help in deciding the pattern (Pl. LIV, Fig. 4). A comparison is inevitable between these wares and the E.P.III Middle Egypt (Badarian) bowls with a point-burnished interior pattern (*Bad. Civ.*, *ibid.*). One point-burnished sherd was of " Smooth-brown " ware.

Neither of the above wares occurred in the cemeteries.

The " C." ware sherd from II M 8, No. 31, Pl. LIV., Fig. 5, shows unusual features, and it is difficult to imagine the shape of the vessel from which it came. The most notable potmark is that of two Addax on a pot from 1,000, No. 83. In the photograph, Pl. LV, Fig. 4, the design has been filled in with white.

A few sherds have raised figures on the outside of the pot (Pl. LV., Nos. 61–64, Fig. 2). They probably represent parts of a scorpion and of a bull's head, and it is interesting to compare

[1] It is impossible to distinguish between a slip and wash in visual examination (see p. 182) and the term coating has been used to cover both terms.

the relief with similar decorations on two stone jars from Hierakonpolis (I, XVII). Similar ware has also been found in the E.P.III (Badarian) period at Mustagedda. See also the pot with scorpion in relief, *Naqada and Ballas*, XXXVI, 87.

Pl. LIV, Fig. 6, shows the " Rough " ware sherds with designs on them. The methods of making some of these designs is described by Miss Billington on p. 181. The Maltese Cross potmark, on the sherd in the bottom right-hand corner, No. 60, is probably intrusive, though the sherd itself is Predynastic. Petrie (*Dec. Patterns*, Pls. LVII–LVIII) shows similar crosses, but with rounded ends from 3,000 B.C. (M.M.I.) and 1,500 B.C. (Gerar).

Some sherds show obvious signs of having been used after they were broken from the parent pot. These are described as " Re-used " in the register and are shown on Pl. LV., Fig 3, Nos. 72–82. The purpose for which they were used can hardly be guessed, though that from II J 2 with nicks all round the edge appears to have served for some work with threads.

Much of interest about the ordinary Predynastic wares has been discovered by Miss Billington in her report, and Dr. Ritchie in his analytical report (pp. 177 to 185), and some of the more unusual wares may be peculiar to the neighbourhood, but this cannot be settled till material from a number of sites has been equally closely examined.

The two most notable contributions to our knowledge of the subject in Miss Billington's report are the firing temperatures and the method of manufacture of the rims. She is in no doubt that in a number of pots the temperature was between 1,100 and 1,200° C., and usually exceeded 800° C. Sir Robert Mond suggests that the difficulty in obtaining the temperature might have been overcome by arranging a furnace so that the usual North wind of Egypt created a forced draught. Compare the Middle Kingdom kiln in *Beni Hasan I*, Pl. I (P. E. Newberry). L. Franchet in *Céramique Primitive*, p. 117, says that it is certain the primitive pottery is very lightly fired but that the temperature must have been sufficient to drive off the water of combination, say between 400 and 500° C. On p. 130 he says that the Greek black vases were fired between 800 and 900° C. The difference in clay between the " D." wares and the " P." and " B." wares is commented on in the chapter on the pottery from the cemeteries, p. 49 ff. Miss Billington's conviction that a number of the rims were thrown on a slow wheel cannot be dismissed on account of its novelty, for a practical craftsman with her experience is unlikely to be deceived in such a matter, the explanation may perhaps be found in *Kerma*, IV–V, p. 323, where Reisner says : " The local (Kermah) pottery was hand-made in two different ways : (a) hand-turned on a circular mat or a dust-filled bowl ; (b) built up in a basket . . . the hand-turning of pottery was the method used in the Predynastic period in Egypt and Nubia, the method which naturally led to the use of the revolving circular disc or wheel." Further evidence on this point will be forthcoming when Dr. Rees's report on some of the specimens is published in a future volume on Armant cemeteries. Meanwhile an attempt is being made to devise tests for pottery, by which it may be possible to assess the firing temperature of any sherd or pot as well as other features. For this we have obtained the collaboration of Mr. A. Lucas and Miss Billington. The experiments are in an early stage and some of the first results are given on p. 267. Miss Billington is firing a large number of sherds of different composition at different temperatures and it is hoped to have some more positive results for publication shortly.

Dr. Ritchie's extremely interesting report has settled a number of points. He shows that a differentiation between slip and wash is not scientifically possible unless analysis has taken place and throughout this volume and elsewhere the authors propose to use the word " coating "

in the sense of "slip or wash." He has established the composition of the various pigments used for prehistoric pottery, of which Lucas says (*Anc. Eg. Mat. and Ind.*, p. 334): "No record of the analysis of the pigments used on the Predynastic pottery can be traced; the white being either calcium carbonate or calcium sulphate and the reddish-brown being an iron oxide (ochre)." A serious gap in our knowledge of this interesting pottery is therefore filled.

The colour descriptions of the sherds have been approximated to Messrs. Winsor and Newton's *Specimen Tints*. This method, though imperfect, is more satisfactory than general descriptions. Four different sherds were submitted to Dr. Scott Taylor, of the staff of Messrs. Winsor and Newton, for description by the Ostwald method, and his report appears on p. 187. See also the comment on the colours of the beads on p. 73.

Dating. Miss Caton-Thompson (*Bad. Civ.*, pp. 78–79) has tabulated the pottery by wares, showing the number of examples of each kind of ware found in the different levels. Her resulting table is admirably clear and confirms her deductions from other evidence about the stratification of that site. It has been decided, however, to consider the evidence in the present settlement by Sequence dates. One reason for this is that the classification by varying inconsistent criteria in the *Pre. Corpus* is insufficiently exact. For example, the "P" class includes *Nile-ware* with an even polished red ochre coating such as is found from the Early Predynastic III (Badarian) to the Middle Predynastic period, *Chaff-wares*, and *Desert-wares* with a dull and unpolished coating such as belong to the Middle Predynastic and Late Predynastic. Also we wished to date the flint types exclusively found in the villages with the pottery Sequence-dated from tombs, and in this connection Miss Caton-Thompson has said: ". . . I have felt increasingly the necessity of obtaining data for the correlation of flint types with pottery types on a far more extensive scale than may be expected from cemetery material. . . ." (*Bad. Civ.*, p. 70.)

For preface to this attempt to Sequence-date a settlement a quotation from Miss Caton-Thompson's work is appropriate: "But in this connexion (stratification) I would wish to emphasise that no claim for exaggerated accuracy is advanced; the very nature of a settlement gives the lie to such a claim. All that can be maintained is that care was taken that the information *as left by its prehistoric population*, should be recorded as accurately as lay in my power, and that such information should, judged as a whole, give information just as reliable as that wrested by the same means from European Stone- and Bronze-Age sites. Humanity does not live under strictly stratigraphical rules, and units of archæological evidence will, inevitably, be out of place, however undisturbed subsequently a site may be."

To that it must be added that at Armant the site was as the Romans and Copts, rather than the Prehistoric population, left it. In what follows we have made clear within what degrees of accuracy the work lies, the method of obtaining the results have been set out *in extenso*, and the possible sources of error plainly indicated.

The Sequence dates were obtained, except where they are underlined, by typing such of the pot as remained, which usually included the rim, to the similar pot, or class of pots in the *Pre. Corpus* and *Bad. Civ.* Some pieces could be typed to a particular form, some to within two or three forms, and some only to an entire class, or even several classes. In each case the widest range of date was given. The roughness of this method is apparent, but the fact that the widest range of forms to which the pot could belong was always given, compensates in accuracy for any loss of precision.

For ease of reference, lists of the dated sherds in each level are given below, and to these have been added the sherds which can be identified as belonging definitely to one or other of the well-known Predynastic (E.P.IV to L.P.) wares, "B." "P." "D." etc., and are thus S.D. 30–82. The bulk of the material, undoubtedly of the same general date, has been omitted because its ware could not be given, e.g. sherds either of "B." or "P." wares; "R." and "T." wares have not been inserted because, unless the types are known, they might be E.P.III (Badarian). At the top of each table will be found all the examples of the wares associated in Middle Egypt with the Badarian culture, and also point-burnished sherds, and Nubian forms, together with their ratio to the total number of sherds in the tables. Sherds marked † come from squares (Pls. LXXVI–LXXVIII, and pp. 258A–C) in some part of which evidence of Roman disturbance, other than a grave, was found. It was not necessary to mark the squares in which Roman graves were found, since the graves were cleared at the beginning of the excavation, as explained on p. 164.

For the explanation of the marks X, Xn, and N after the dates see the discussion which follows the tables, especially pp. 173–174.

Some explanation of the dates is necessary. Where a sherd has been compared with an entire type, such as B29, the whole range of the type is given, except that, if one sub-type has a doubtful date—from one uncertain tomb—(enclosed in brackets in Petrie's types, marked with a superior [1] [e.g. 30–68[1]] in types from Badari and Armant), this date has not been included in assessing the total range of the type. Occasionally, though the sherd can be compared only with a type, one sub-type is obviously excluded from the comparison by some peculiarity, e.g. P26s in classes P26–28. As explained on p. 57 the dating of the new types in *Badarian Civilisation* is on a wider basis than has been used at Armant. In dating the graves we did not make use of the new sequence dates at all, but here, where every available dating evidence is necessary, we have re-assessed the Badari types on the evidence of the pottery alone in the graves in which they were found. In a case like this, the writer is very grateful for the full tomb registers given by Brunton. All the types from *Badarian Civilisation* are marked (B) after the type number and have a small figure after the date to show the number of graves from which the dating is obtained. Types from the Armant cemeteries have (A) after the type number and the same indication after the date.

One exception has been made to taking the widest range of date. In type P24 one sub-type ($P24m_3$) is dated by Petrie 57–63, and P24l is dated 47. Sub-types, k, g, and n, have been dated at Armant 36–48 from the evidence of fourteen graves. This type is found in both *Desert-ware* and *Nile-ware* (see p. 49 ff) and experience shows that it is the *Desert-ware* examples which are late and the *Nile-ware* early. The sherds of this shape from Level III were all in *Nile-ware* and the date 36–48[14] has been used for the purpose of this table.

LEVEL THREE (LOWEST)

† 2 keels 3 Keels 2 "P.B." 3 "S.B." † 2 "S.B."	= 12 "Badarian"	% ages of total sherds in the table—41	29
† 2 Point-brnshd. 2 Point-brnshd.	= 4		10

LEVEL THREE (THREE)—*continued.*

	Sequence Date		Type No.	Square No.
	30(–48)		B84	K 8
	31–47		P63–71	J 7
	31–61	X	B12–17	J 10
	31–63	X	B11	A 1
	(34–)35		P18	C 2
	36–43[2]		P13f2 (B)	C 2
3	36–48[14], 57–67		P24 (A)	L 13, M 11, O 12
	38–73, 80	X	P23–24	J 7
	40–63	X	D7–8	K 8
	42–77[27]	X	R84 (A)	H 9
	52	N	D2	O 13
	52, 72, 78	N	R27	M 11
11	30–82	X	"B.", "P.", "C.", "D."	
41				

Proportion agreeing with the dating given to the level by the majority of the Sequence dates (see pp. 173–174).

7 Positive
16 Neutral (X)
2 Negative (N)

or % ages of total dated sherds—25: 28, 64, 8

LEVEL TWO (MIDDLE)

1 Ripple
9 Keels
1 BR43f not rippled
1 BR36h " "
1 "P.B."
5 "S.B."
1 "S.B." Point-brnshd.
8 Point-brnshd.
† 1 " "
3 Nubian
† 1 "

19 "Badarian"
10
4

or % ages of total sherds in the table—96: 20, 10½, 4

	Sequence Date		Type No.	Square No.
	30–56, 59		B25	T 14
†	30–56, 59		B25	B 3
†	30–58		B29	B 1
	31–41		P66–69	L 12
	31–44		P63–67	J 12
	31–47		P64–70	H 10
	31–55, 63	X	B27	N 10
	31–55, 63	X	B23 or 27	O 10
	31–61	X	B66–68	K 7
	31–63	X	B11	N 8
	31–70	X	B1	R 12
	31–71, 80	X	P11	H 11
2	32–47		P15	L 12, M 13
†	33–80	X	P22	B 2
	33–80	X	P22	C 2
†	35–68	X	B58–64	B 3
	35–73, 80	X	P23	M 14
	37	N	F64	N 14
	38		B33	G 9
	38–67[71]	X	R23c	M 13
	38–73, 80	X	P23–24	J 10
2	39–81	X	L7	K 12, O 8
	40–55		D31–33	K 10
	40–55, 59		D31–35	N 10
	42–77[27]		R84 (A)	J 9
	42–77		R65–66	T 14
	(43–71), 81		R33b	L 12
	43–80		R26 or 33	H 9
	46–72		L26	O 13
	50		P34a	J 10
	51		R95	G 12
	(51–63)		R44l	O 13
†	53–60[1]		R3f5 (B)	L 8

LEVEL TWO (MIDDLE)—*continued.*

	Sequence Date		Type No.	Square No.
	53–60[1]		R3f5 (B)	J 10
	56–78		L17n	J 8
	57		B12a	A 5
	(57–66)		D49b	J 10
	57–71		R1d (B)	S 13
†	57, 81		R32a	B 2
†	58[8]		R26c (A)	M 9
	63–66?[71]	Xn	R3f8 (A)	M 7
21	30–82	X	"B.", "P.", "C.", "D.", "W.", and "L."	
96				

Proportion agreeing with the dating given to the level by the majority of the Sequence dates (see pp. 173–174) [sherds, of which the date and not the position is considered to be at fault (see p. 173), marked Xn, are counted as neutral]:

26 Positive
36 Neutral (X)
1 Negative (N)

Or percentages of total datable sherds—63: 41, 57, 2

LEVEL ONE (TOP).

1 Ripple
1 Ripple S.B.
5 S.B.
1 P.B.
1 Keel PR9d?
3 Keels PR9?
1 Keel (Bk.)
3 Keels
11 Point-brnshd.
† 3 " "
1 Nubian

2 Ripples
6 S.B.
1. P.B.
8 Keels

16 "Badarian"
14 Point-brnshd.
1 Nubian

or percentages of total sherds in the table—143: 11, 10, 0·7

	Sequence Date		Type No.	Square No.
3	30–58	X	B 29	E 6, F 4, N 11
†	30–58	X	B29	D 1
†	30–58, 72	X	P15–17	C 1
	30–80	X	B19–27	G 10
	31–39	N	P68	T13
†	31–44	N	P63	L 8
	31–63	X	B11	N 9
2	31–71, 80	X	P11	J 11, N 11
	31–73	X	P56–59	N 11
2	31–61, 76	X	B74	R 14, M 7
	32–51, 70	X	B35	F 4
	33–64	X	R3	M 11
2	33–78	X	R83	M 13, F 1
5	33–80	X	P22	D 5, E 4, F 2, M 7, N 7
	34–50, 72	X	P26–28	K 14
	34–62	X	R12b	F 2
	35–48	N	P21	N 10
	35–61	X	B11a	J 7
3	35–68, 80	X	P23c	H 12, J 8, M 11
†	35–73, 80	X	P23	M 9
	35–73, 80	X	P23	A 1
	36	N	P6	N 7
†	36, 44	N	B66b	L 8
	36–67[15]	X	P24 (A)	D 6
	36–71	X	R69	E 5
	37–53[1]		R3e (B)	N 10
	37–58	X	R93	M 14
2	(38–43)	Xn	D93b	J 14, L 11
	38–67	X	R81	F 2
†	38–67	X	R81	B 1
	40–45, 48	N	D31	F 3
	41	Xn	R3b	N 11
3	42–77[27]		R84 (A)	K 9, L 12, M 10
†	42–77[27]		R84 (A)	C 2

LEVEL ONE (TOP)—*continued.*

	Sequence Date		Type No.	Square No.
	42–81		R24or26	F 4
	(43–44)	Xn	P19g	N 11
	43–66, 80		R33a	F 3
	(43–71), 78, 81		R33b	F 6
2	44–45[1]	Xn	P22a2 (B)	E 1, E 3
†	45–82		L17	L 9
	46	Xn	R81k	R 13
†	46–65		D16	C 6
	47–73		R65	E 2
	(48–53)		L7f	L 12
	48–57[1]		R23g (B)	M 11
	48–66		B50	O 12
	50–58[3]		P24m3 (*B*)	K 14
	51–80		R16	F 3
	53–66		R42	F 3
	53–77		R 36	O 10
	57–62[2]		R84t (A)	J 11
	(57–64)		B2d	G 14
	58[6], 72–80		R 26	M 13
2	58–63		R44	E 3, D 5
	58–81		L36	K 9
	62		B54m	M 13
	62–66[1]		L19d (B)	J 10
	63		D1	R 14
†	63		D1	C 6
4	68–78		L12d	G 11, H 10, H 13, L 14
	71–78		L33n	K 9
	72–80		L86	J 10
	77–80		L46m	L 14
30	30–82		"B.", "P.", "D.", "W.", "L."	

Proportion agreeing with the dating given to the level by the majority of the Sequence dates (see pp. 173–174) = (sherds of which the date and not the position is considered to be at fault [see p. 174], marked Xn, are counted as neutral) :

35 Positive
71 Neutral (X or Xn)
6 Negative (N)

} or percentage of total datable sherds—112 { 31, 64, 5

Proportion as above for the three levels :

68 Positive
123 Neutral
9 Negative

} or percentage of total datable sherds—201 { 34, 61·5, 4·5

If the sherds from disturbed areas, marked †, are not taken into account, the percentages are : Positive 32, Neutral 64, and Negative 4.

Considering only those sherds with Sequence dates, and omitting two sherds in Level III two in Level II, and thirteen in Level I, (marked N or Xn) we find that :

Level III must have begun by S.D. 35 and could not have ended before 38 or 42.
Level II must have begun by S.D. 38 or 41 and could not have ended before 57 or 59.
Level I must have begun by S.D. 53 or 58 and could not have ended before 72 or 78.
Thus giving the following periods :

III 35 minus to 40 (*circa*)
II 40 (*circa*) „ 57 „
I 57 „ „ 78 plus

The seventeen inconsistent sherds, marked N or Xn in the above lists, remain to be accounted for. Errors may have arisen in any of the following ways :

(1) The levelling had an error of about 2 cm.

(2) Since there were no visible strata, the levelling may not have followed the original stratification, which may have been quite irregular in depth. As Miss Caton-Thompson says : " Humanity does not live under strictly stratigraphical rules."

(3) Sherds may have been displaced by burrowing animals, and by man anciently or in modern times. In the later periods, pots from tomb robberies might have been introduced.

(4) There may be errors in typing since this was mostly done only from sherds.

(5) The dates originally given to types may well be exceeded in length of time, especially at a site different from that at which they were formulated.

It is impossible to check (1) and (2) and as the errors in different levels do not occur in the same squares there can be no check on (3). (At the bottom of the table above a note is given showing the difference in percentages when the squares with evidence of Roman disturbance are omitted from the calculations.)

Considering (4) and (5) some reduction in this figure for error can be made. The dating of two sherds in error, both type D 93b (from J 4 and L 11), is bracketed in the *Pre. Corpus*, which means that the pot occurred once only, and then in an uncertainly dated tomb. It is reasonable to assume that the original dating of the type is at fault, because D 63a in the above corpus, a very similar pot, is dated 48–63, and two corpus additions from Armant, D 63, and D63a1, are dated 42–59 and 29–61 respectively (Pl. XXV). R81k is very similar to R81k_2 and k_3 which are dated at Qau to 35–68[1] and 41–58[1] respectively (revised dating), and R81j was found at Armant in a tomb dated 57–64. The date of P19g is also bracketed in the *Pre. Corpus*. R 3b is a very rough form and R 3a and c are dated 33–64 and 42–63 respectively. R3f8, equally rough, was found at Armant in one doubtfully dated tomb only, P22a2, occurring twice, is dated from one tomb only in *Bad. Civ.* and may have had a wider extension in time than there shown, as P22a, different in size alone, ranges from 33–80.

This leaves only nine sherds, the misplacement of which is unlikely to be due to errors in typing or in the original dating of the pots, but, though there are 201 sherds, which are in some way dated, the above cannot be described simply as a 4·5 per cent error, for many sherds extend so widely in date that they would be equally at home in any level. In estimating the reliability of the hypothesis by the proportions of misplaced sherds to those agreeable with the hypothesis, it is necessary to regard as neutral all those which extend in date from 40–57 or beyond those limits. It is not necessary to discard, level by level, every sherd which might have been included in another level without upsetting the dating, because many show a confirmatory trend as between levels III and II *vis-à-vis* I, and levels I and II *vis-à-vis* III. The dates of sherds which are neutral to the result of the calculation are marked X and the eight inconsistent sherds, whose misplacement can reasonably be attributed to errors in typing or in the dating of the pots, are marked Xn and counted as neutral. This gives of sherds which are against the hypothesis (Negative) 9, Neutral 123, and in favour of the hypothesis (Positive) 68 ; or in percentages 4·5, 61·5, 34. If the neutral sherds are not considered, the percentages of Positive and Negative are 88 and 12.

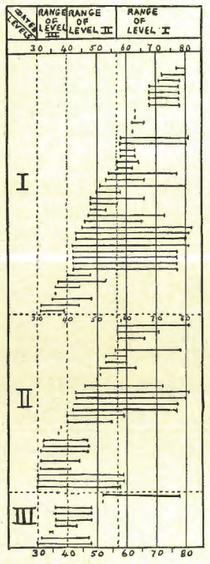
It is possible, however, to urge against this result that the same arguments (showing five possible sources of error) which have been used to explain the misplaced sherds might be applied to explain those which are harmonious with the hypothesis. The answers to this are :

(1) Unless there is evidence to the contrary, it is assumed from experience that the lowest levels of a settlement are earliest and the highest levels latest.

(2) The excavation evidence on p. 163 is strongly opposed to any alternative theory.

(3) Experiments made to test the possibility of lateral growth of the settlement in any direction yielded no result which had a comparably close concordance between the hypothesis and the observed facts.

(4) Out of 17 " Negative " sherds, 7 had uncertain dates while there are only 9 uncertain dates among the 70 " Positive," i.e. 41 per cent to 13 per cent.



SEQUENCE DATES

(5) The adjoined graph illustrates better than words the force of the evidence. The vertical dimension represents levels and the horizontal dimension sequence dates. The lines with stops at each end represent the total ranges in date of the sherds, all the " Neutral " examples being omitted. It is important to remember that a line represents the possible range of date of a sherd and must be regarded as a whole, and the apparent curve given by the beginnings of the lines is only due to the order of arrangement of the sherds (by their earliest dates). The widths of the vertical columns represent the periods covered by each level and by means of these an even stricter test is applied, since no overlap is allowed between the levels. Even by this method there are only 13 sherds which are misplaced (Negative), and against these there are 22 whose range does not extend beyond the limits of date assigned to the level in which they were found, in addition to the remainder, 44, which extend through the period of two levels and are also correctly placed (66 Positive).

The above hypothesis concerning the relative dates of the different levels is therefore that which accords with the largest number of observed facts, and may be safely regarded as correct.

The greater proportionate frequency of discordant sherds in the top level may possibly be due to disturbance caused by the Roman or Coptic burials, for, whereas the material in the graves was rejected by us for levelling purposes, thus preventing sherds that had worked down from being included in the lower levels, material brought up by the Romans in the course of their excavation might well have been introduced into Level I.

Both a larger quantity of material and a wider range in dates is observable in Level I than in Level II which was of the same depth. It is possible that this may be accounted for by ancient wind-erosion of the dusty deposit.

There remains the problem of the three rippled sherds, the keels, and the smooth-brown and other wares, associated in Middle Egypt exclusively with the Badarian culture.

The frequency of these precluded accident as the cause of their occurrence, with the exception of the three rippled fragments, which may safely be ignored.

In Level III there were 5 keels and 7 " Badarian " wares. Since some of the keels were in " Badarian " wares (two in Level II were typable to forms in *Bad. Civ.*) the percentages may be taken jointly, and these are seen to be : Level III 29 per cent, Level II 20 per cent, Level I 11 per cent. This decline cannot but be interpreted as meaning that these wares existed throughout the period of the settlement at least into the beginning of Level I—say S.D. 60, declining all the while in popularity ; but, before concluding that, at Armant at least, the Badarian culture was contemporary with the Predynastic, other facts must be taken into consideration.

A large number of Predynastic graves of all dates has been excavated at Armant, and the pottery was quite normal and showed no evidence of Badarian influence. Neither can the settlement be supposed to be of an entirely different culture, seeing that the normal Predynastic wares were found throughout it in quantity.

The only explanation remaining seems to be that the " Badarian " wares continued in use, at least at Armant, for everyday purposes after they had been abandoned in tomb furnishings. This is more probable than it sounds at first. It must be remembered that although to modern eyes the Predynastic (E.P.IV to L.P.) wares are less fine than the Badarian, to the people of the time they were doubtless considered superior, their colour being brighter and their finish usually higher, with a consequent lesser porosity and destructability.

Possibly the ripple sherds are also not intrusive, but rare survivals. Very small traces of E.P.III (Badarian) occupation have been previously discovered at Armant (*J.E.A.* XVII, November, 1931), and among the pottery, rippled sherds were rarer in relation to the smooth wares than at Badari, or Mustagedda. The question must, however, remain open at present, for nothing can be finally decided until another settlement, such as that near cemeteries 1400–1500, and further graves have been dug.

The percentage of keels falls from 12 in Level III, through $9\frac{1}{2}$ in Level II to $5\frac{1}{2}$ in Level I. The sherds with patterns point-burnished in the interior (Pl. LIV., Fig. 4) has the following frequency : Level III 10 per cent, Level II $10\frac{1}{2}$ per cent, Level I 10 per cent, showing no increase or decline in popularity. One of the burnished sherds is " smooth-brown " and it is necessary to notice the kinship between this decoration and the slightly different point-burnished patterns found in the interior of the E.P.III M.E. (Badarian) bowls, for this similarity affects the interplay of the Badarian and Predynastic cultures. The explanation of this must also be looked for in further work.

The Nubian forms are insufficient for any conclusions to be drawn from them.

As has been explained above, p. 163, it was not found worth while to excavate the section of the settlement 1,100 level by level. The following sherds from the pit were typed :

P23	38–80
P11	31–80
L46	60–80
R33b	78, 81
L7F?	48–53
P24	44–64

Pottery Figures. The settlement was particularly fruitful in complete and fragmentary pottery figures. Only three, Nos. 84–86, Pl. LV/5, could be identified as belonging to human figures. No. 84 appears to be the buttocks of a slightly steatopygous figure, No. 85 a torso, showing the belly and right hip (though this is less certain) and No. 86 a breast. If these attributions are correct, the style is slightly different from that usual at the period (see *Pre. Egypt*, Pls. III, IV, V and VI), being probably a little more naturalistic. No. 97 might be a crudely modelled *phallus*.

The most numerous and interesting figures are those of animals, chiefly very stylised figures of oxen, of which seven of the best-preserved examples, Nos. 100–107, are shown on Pl. LV, Fig. 6. The only close parallel to these are the three figures in *Pre. Egypt*, Pl. VII, 11 to 14, representative of seven in U.C.L. of which the *fundplatz* is unknown. We have been unable

to trace any record of such figures from other Predynastic settlements. Several figures of oxen, in mud and pottery, have been found in graves, such as those from *El Amrah and Abydos*, Pl. IX, and *Pre. Cems. of Mahasna*, Pl. XXI, but they are all naturalistic in comparison with the present examples. It is a curious coincidence, if no more, that one of the earliest evidences of extensive attention to cattle in Egypt should have been found within two kilometres of the Bucheum. The intense interest in animal worship during the Late Historic Period is often attributed to a revival of local submerged cults in answer to the invasion of foreign religion taking place at that time, and it is quite possible, if not probable, that bull worship at Armant dated from the earliest times. In all, nine of these figures, including fragments, were found in the settlement, and there were twenty-four more fragments of animal figures which could not be identified. 101/11 M 9, has two rough ovals each side of the neck, stretching from the crest down, which are probably intended to represent the folds of skin. These are barely visible in the photographs. No. 108 (which is now in Cairo) would seem to be a duck or goose, more probably the latter. No. 109 is better modelled than any other figure from the site (except perhaps the goose), but it is, nevertheless, enigmatic. The most probable animal seems to be a pig and figures of these are sometimes found in the Predynastic period. But against this it must be admitted that the hollow back is not characteristic of the pig and is not shown on either the wild boar or the domestic pig (see *Hierakonpolis* I, XXII, 8, *J.E.A.*, XIV, Pl. XVIII, and *El Amrah*, Pl. IX, 4a and 4b, respectively for these animals). No. 110 is probably the hind quarters of a hippopotamus.

Reverting to Fig. 5, Nos. 87 to 89, are almost certainly legs of animals, Nos. 90–91 appear to be parts of plain pottery rings. No. 92 is carved out of a sherd, and is not modelled. It resembles the sacred eye, and might be intrusive. No. 93 might be the prow of a pottery boat, but this is very uncertain. Nos. 94–100 are unidentifiable, with the possible exception of No. 97, which has been described with the other human remains.

Nos. 112–117, Pl. LVI, are all probably parts of pottery boats. These boats are not very commonly found, but three are shown in *Naqada and Ballas*, Pl. XXXVI, 80, 81a, 81b, and two fragments similar to ours in *Bad. Civ.*, LXXI, 79 and 80. Nos. 118–122 are a selection of the pierced pottery discs generally considered to be spindle whorls.

No. 123 is a lump of clay made by pressing between the palms of the hands. Three more of these were found in tomb 1542 and are drawn on Pl. XXVI and photographed on Pl. LVI, Fig. 4, Nos. 137–138. Peet found these objects at Abydos (*Cemeteries of Abydos II*, Pl. III, d.6). No explanation of them has yet been suggested, but their occurrence in a grave as well as in a village implies greater importance than if they occurred only in the village. The ridges are hardly sharp enough for them to be foot scrubbers. No. 124 is part of a small vase with suspensory holes.

Miscellaneous. A few pottery objects not from the settlement have been illustrated in the plates belonging to this section and brief mention of them is therefore made here. Plate LVI, Figs. 2 and 3, show some typical sherds of Badarian pottery from various parts of the settlement. Those in Fig. 2 come from the eroded grain pits[1] which were described in *J.E.A.*, November, 1931, and are E.P.III in date. Those in Fig. 3 come from various places. It will be noticed that Nos. 125–126 are fragments of Tasian ware and may be E.P.II in date.

[1] Evidence from excavations in 1936 shows that these were not eroded grain pits but sunk hut circles.

No suggestion about the origin of No. 134 in Fig. 4, Pl. LVI., can be made. It is of the usual B. ware and comes from tomb 1485. No. 135 is a lump of lightly-fired yellow clay with a number of small holes pricked in it. It came from cemetery 1500. The two hands, Nos. 137–138, from tomb 1542 have already been described. No. 136 is a good example of decorative pebble-burnishing on a pot without a coating. No. 139 has an unusual pattern or maker's mark, on a Protodynastic or Old Kingdom sherd, from the cemetery in the neighbourhood of 1207 and 1208. Nos. 140–142 with unusual decorations are also drawn on Pl. LI and No. 142 is described by Dr. Ritchie on p. 184.

O. H. M.

The Technology of the Pottery

As very little work appears to have been done upon the technology of Predynastic pottery (with the exception of Mr. Lucas's study of the black-topped ware) it was decided to have some typical and some exceptional sherds examined. These were submitted to Miss Billington, Instructor in potting at the Central School of Arts and Crafts, London. The following is her report. Ed.

Some Sherds from Settlement 1,000

By Dora Billington

It should be emphasised that the following remarks are not the result of any laboratory examination. A few specimens have been examined in the laboratory by Dr. P. D. Ritchie of the Courtauld Institute of Arts (marked (C)) and his results are set out below. Some further specimens marked (S) are under examination by Dr. Walter J. Rees of the University of Sheffield and I understand that his report will be published in a later book. My own conclusions are presented as those of a craftsman familiar with the material from everyday making and handling, and the only tests applied were such simple ones as those for hardness, ring, and porosity. Examination was visual, only a small lens being used. Such matters as the firing temperature must, therefore, be taken as indications rather than exact statements of fact, carried out by comparing the specimens with modern examples of varied composition fired at known temperatures. The Egyptological classification has been supplied by Mr. Myers.

The term " stoneware "[1] has been used to describe those specimens that have a hardness almost equal to granite and cannot be scratched with a steel blade, have a true ring, and show a vitreous section, hence having little or no porosity.

Any specimens with a granular, " earthy " texture, however hard, have been called " earthenware."

265/1,100 Pit. L7F ? Firing temp. c. 1,150. Hard earthenware, very slightly porous. Well and evenly fired. A quantity of sand in the clay, which was very well prepared. No added chaff. Colour c.[2] Rubens' Madder. The neck thrown on some kind of slow wheel.

266/I.L.12 (S). " L." ware. Firing temp. c. 1,150–1,200. Very hard earthenware,

[1] This term has not been used in the classification of predynastic pottery used by Mr. Myers as Mr. Lucas considers it might be misleading, giving the impression that crushed stone had been added—no such implication arises here.

[2] c =circa, i.e., the nearest specimen.

almost stoneware. Only just porous. Quantity of sand. No added chaff. Has vitrified as if felspathic clay were used. Colour Cobalt violet dark due to slight " reduction " in the process of firing. Neck finished in the same way as above.

267/1,100. " P." ware. Firing temp. c. 1,050. Earthenware. Slightly porous, sandy body. The rim shaped by slow throwing, in a finer red clay with less sand. Colour c. Rubens' Madder. Coating on outside, colour c.[1] Indian red. Not quite so well fired as 265 or 266. Shape and treatment similar.

268/1,000. " R." ware. Firing temp. c. 500. Clay almost unchanged. Quantity of chaff. Very poor shaley clay, badly prepared. Only held together before firing by the chaff. Colour c. Permanent brown, inside black. Very porous. When part was fired in an electric oven to 1,000, the black disappeared and the brown began to turn red.

269/I.L.13. (S). " R." ware. Firing temp. c. 900. Added material that looks like shell but does not re-act to acid,[2] flint flakes ? or mica ? It appears in laminated form like mica. Amongst this were two fragments, probably of red ochre. Poor shaley clay. Slightly porous. Colour mineral grey. Coating on exterior. Colour Mars orange.

270/I.M.12. " R." ware. Firing temp. c. 900. Poor shaley clay. Added chaff. Very porous. Colour mottled brown and red.[3] Darker streaks on interior probably due to burnishing.

271/I.H.12. " R." ware. Firing temp. c. 500. Poor shaley clay containing spots of darker clay, imperfectly mixed together. Only slightly porous. Colour Cobalt violet dark. Mat imprint on exterior surface. Interior smoothed by hand.

272/I.E.3. R44. Firing temp. c. 900. Poor clay with added chaff. Colour c. Light red between two layers of darker brown clay.[3]

273/I.J.7. " R." ware. Firing temp. c. 1,100. Shaly clay similar to No. 271 above, but more highly fired. Slightly porous. Thumb-smoothing marks inside and out. Has been touched by another object in the kiln which stuck to it, leaving an open scar on the surface. Chrome orange with darker patches.

274/I.E.3. (S), 275/I.J.14, 276/II.K.8. " R." or " T." ware. Firing temp. c. 1,000 (II.K.8. c. 1050). Good hard body containing micacious sand and flint or mica chips. Fairly porous. The inside has the appearance of a coating 2 mm. thick, of fine red clay, but this is almost certainly only a difference in firing. The inside is more even than the outside, though, judging by II.K.8, there was originally a superficial polish on the exterior. Colour out : Rubens' Madder (mottled), in : Rubens' Madder.

277/II.M.8.(S). " S.B." ware. Firing temp. c. 1,040. A fine micacious sand added to the clay (unlike the L. and R. wares where the sand is coarse). Porous. Outside burnished downwards and the inside round. Colour c. Burnt Umber.

278/1,100 Pit. P23. Firing temp. c. 1,050–1,100. A well-prepared sandy clay, compact. Not very porous. Darker streaks in the material in one place—due to admixture of different clay ? (These streaks, apparently due to organic matter, burned away completely at 1,050° C.) Colour c. Rubens' Madder. Coating on inside and over rim, not burnished in any way. Can now be given a slight polish with an ink eraser.

279/III.O.12.(S). P.24. Firing temp. c. 800–1,000. Quickly fired clay partly unchanged.

[1] c = circa, i.e., the nearest specimen.
[2] Tested with H_2SO_4, HCl, and HF, cold and dilute.
[3] General terms only.

Probably no added sand. Poorer clay than 277 (" S.B." ware). Porous. Surface colour c. Indian red. Coating inside and out well burnished throughout. Two repair holes both bored from inside.

280/I.F.3. " P." ware. Similar to the above. Mending holes. One near the rim bored from outside and the two lower ones bored from within.

281/1,100 Pit. P24. Similar to No. 278. The coating partly and roughly burnished.

282/1,100 (C). " D." ware. Firing temp. c. 1200. Stoneware. Added grit. Probably felspathic clay. Colour Cobalt violet No. 2. Surface Terre verte olive. (Coating ?). Decoration colour c. Violet carmine. Non-porous[1].

283/1,100 (S). " D." ware. Firing temp. c. 1,150–1,200. Stoneware. Very sandy body containing added grit. Almost non-porous. Colour charcoal grey due to firing in a reducing atmosphere. Coating inside : colour Cobalt violet No. 2. Decoration colour Indian purple.

284/I.R.14.(C). D1. Firing temp. c. 1,000. Fine, well-prepared clay probably without added sand. Colour Rubens' Madder. Decoration colour Indian red.

299/II.G.11.(C). " D." ware. Firing temp. c. 1,150. Almost stoneware. Added grit. Colour Monochrome tint cool No. 1. Decoration colour Neutral orange. Neck thrown on slow wheel.

285/III.J.7. " R." or " T." ware. Firing temp. c. 1050. Coarse shaley clay without any addition of sand or chaff. Well fired. Barely porous. Colour variegated from Rose doré to black.

286/I.K.7. Specimen with dark streaks running through it was re-fired to see if these were stains. They disappeared at 1050° C., so they were probably stained from use.

287/II.J.12.(C). P63–67. Firing temp. c. 900. Sandy body. Burnished in and out. Colour c. Light red. Possibly a coating. c. Neutral orange.

288/1,100 (C). " P." ware. Firing temp. c. 1,000. Clay with a little added grit. Colour c. Rose doré. Coating inside and just over rim c. Indian red. Coating outside Monochrome tint warm No. 1.

289/III. K.14. (S). " P." or " B." ware. Firing temp. c. 900–1,000. Probably some added sand. Moderately porous ware. Outside edge of rim colour c. Light red, not due to coating or burnishing. Colour of ware Ivory black (grey), but interior burnished to c. Brown madder. Exterior below red patch mentioned c. Indian lake (mauve). Division of colour visible in section.

290/I.H.14. (S). " B." or " P." ware. Firing temp. 800–900. Porous. Body with micacious sand. Body colour Roman sepia. Interior and just outside rim black. Exterior coating Burnt sienna, largely rubbed off.

291/1,000. (S). " B." ware. Black.

65/1100 (Pl. LV). " T." ware. Large storage bowl. Probably built in strips. Under rim are marks of smoothing round the periphery that indicate turning, probably only on its own base. Plenty of coarse chaff. Firing 700–800. Warm sepia and Brown madder.

66/1100 (Pl. LV). Similar ware. Moulding turned over (undercut) probably to form a rim for lifting. (Hardness under Moh 3). Vandyke brown.

[1] Sufficiently non-porous to be called " stoneware." Porosity is a matter of degree. Practically all pottery is slightly porous.

51/1100 (Pl. LIV). " R." ware. Neck and everted rim. Firing 700–800. Black clay with traces of red coating in patches. This has scaled off over the greater part of the surface, and the non-adherence suggests a very low firing temperature and considerable shrinkage of the body. Natural sandy clay, very porous[1] rim thrown on a slow wheel. Impressed pattern down towards shoulder, very regular and repeating every seven. The pattern was subsequently polished over. Ivory black, streaked with Light red.

44/1100 (Pl. LN). " R." ware. Turned in rim of bowl. A quantity of coarse chaff. Firing 700–800. Pattern scratched. Burnt sienna.

49/1100 (Pl. LIV). " R." ware Some coarse chaff. Firing to 1050. Roughly finished. Scratched pattern made with a sharp edge. Warm sepia.

58/I.J.14. (Pl. LIV). " R." ware. Everted rim. Fragments of shell and considerable fine chaff. Very micacious clay. Neatly made by pinching. Thoroughly fired at about 900. Impressed and dragged pattern, made probably with the rounded end of a piece of reed or wood. Too small to be made with fingers. Warm sepia.

56/II.K.8. (Pl. LIV). " R." or " T." Material not properly welded together. Made by pinching up the pot inside and out. The finger-marks are clear and give visible proof of the method of manufacture. Warm sepia (pale) outside, Burnt umber inside.

12/1513 (Pl. LIV). Keel. Very micacious clay, with added sand. A brown[1] ware thoroughly fired to about 1050. Hard and fairly non-porous. Well finished with a fine black polished coating. Very thin and even below the keel 1·0–1·5 mm. thick. Charcoal grey.

11/II. H.8 (Pl. LIV). Keel. Similar ware. Warm sepia.

9/11. G.8 (Pl. LIV). Keel. Similar ware, less sandy clay and more quickly fired. Burnt umber.

1/II. M.12 (Pl. LIV). Keel. Similar ware to last. More thoroughly fired and more highly polished. Neutral orange.

295/Buch. X. " L." ware. Evenly made bowl with fine contour and even section. Probably a pale coating inside before polishing. Rough vertical pebble burnishings inside. Light red.

43/1100 (C) (Pl. LIV). " D." Ware. Micacious clay with added sand. Brown ware[1], fired to about 1050 (not stoneware), stroked round inside. Red[2] decoration on black coating.

61/1100 pit. (Pl. LV). " R." ware. Decorated with relief pattern. Soft ware with a little sand and a quantity of fine chaff much of which still remains. Badly mixed clay. Firing about 500. Some of the clay spilt over the surface of the pot before or during firing, and is lightly fired but detachable from the surface. (See also Mr. Boodle's report on the chaff from this pot.) Neutral orange.

136/PMX (Pl. LVI). " L." Ware. Very fine, well-prepared clay. Pebble burnished in a rough pattern on the interior. Venetian red.

296,297/Buch. X. " Pan grave." Badly mixed clay of a low plasticity, perhaps Nile mud, with a quantity of added sand. Firing about 500. 296 Warm sepia outside, Charcoal grey inside, 297 Indian red outside, Sepia, pale, inside.

298/Buch. X. Similar to above but fired to 600 or 700. Roughly polished. Roman sherd.

127/1300 (Pl. LVI). " BB." ware. Large piece. Fine compact clay, well prepared.

[1] General terms only.

No additional sand or chaff. Fired about 1050. Probably a coating. Rippled. Charcoal black, streaked into Mars orange.

128/1300, 129, 130/Buch. X (Pl. LVI). Three smaller pieces of same ware. All similar to above though one fired possibly only to 1000.

133/ALX (Pl. LVI). " RB." ware. Coarse and sandy. Fired only to about 500. No chaff. Pinched and stroked to make a large coarse ripple pattern.

132/1300 (Pl. LVI). Finer clay, no sand and a little chaff. Fired to about 1000, pinched and stroked.

126/Ar. X. (Pl. LVI). Beaker ware. Clay without any added materials. Quickly fired to about 900 or 1000. *Possibly* brown[1] coating inside and out.

125/Baq. R. (Pl. LVI). The same.

D. B.

Some Predynastic Pottery Pigments

By Dr. P. D. Ritchie

Courtauld Institute of Art (*Scientific Department*)

No analyses of the pigments employed in coloured Predynastic Egyptian pottery appear to have been recorded, though it is fairly obvious that " they are certainly all mineral colours, the white being either calcium carbonate or calcium sulphate and the reddish-brown being an iron oxide (ochre)."[2] The author welcomed, therefore, an opportunity to confirm this view, in respect to ten of the following potsherds of undoubted Predynastic date.

In all these sherds, the pottery base itself was more or less strongly coloured by iron in the clay ; but, in addition, four simple pigments were identified upon the surface—a red ochre, a yellow ochre, a carbon black, and a white calciferous clay.

Further, in the two specimens of contemporary painted stucco examined, the pigments were a red ochre and a coarsely-ground wood charcoal. The white stucco ground consisted of practically pure calcium carbonate.

In discussing the method of producing a surface coloration, Mr. Lucas suggests " that the use of a red wash on ancient Egyptian pottery is less common than is supposed. Polishing so modifies the surface of clay that the light is reflected differently, which naturally affects the colour and may suggest the use of a wash when there is none."[3] In five of the ten potsherds now examined, the strongly coloured surface seems to have been produced by polishing alone. In the other five, however, it was found possible to remove from the surface, by cautious dissection under moderate magnification (30 diameters), a thin layer of ochre (red in some cases, yellow in others), which was almost completely soluble in strong hydrochloric acid. The less strongly coloured body material from immediately beneath the layer of ochre, on the other hand, when treated with strong hydrochloric acid, yielded a large insoluble residue of silicates and silica granules. It seems clear that a wash of ochre was deliberately applied to the surface in these five cases. Although the surface of some of these sherds was polished, it was still possible to distinguish two definite layers by treatment with acid.

[1] General description only.

[2] A. Lucas, *Ancient Egyptian Materials and Industries* (London, Arnold, 2nd Edn., 1934), p. 334.

[3] A. Lucas, *op.cit.*, p. 327.

On 192/1500, and on this sherd only, there was evidence that colour had been applied as a slip—that is, by the application of a paste of pigment mixed with clay. This potsherd showed a very definite outer surface-layer of a purplish-red colour, much thicker than any of the washes of colour described above.[1] This surface-layer was dissected away, and proved to contain a large amount of acid-insoluble siliceous material, after removal of red ochre. The surface was decorated with a pattern in yellow, applied as a fairly thick layer; and when a sample of this was removed and the yellow ochre dissolved away by acid, it left a large residue of silica granules. It is reasonable to suppose that both colours were applied as slips, though it is not impossible that unusually thick washes of very impure ochre are involved.

Three of the potsherds exhibit special characteristics of some interest:

(i) One sherd, 31/II M.8, covered with a wash of red ochre, was lightly patterned in white. The traces of ornament were so thin that no sample of the white pigment could be obtained rigorously free from the underlying wash: but spectrographic analysis of a few almost pure samples showed the presence of sodium, calcium, magnesium, silicon, and some minor constituents. The white material appeared to be an almost colourless calciferous clay.

(ii) The outer surface of 282/1,100 was coated with a thin layer of pale yellowish-green clay. Examined spectrographically, the two clays showed no qualitative difference: but the outer surface contained an appreciable amount of chromium (as against a mere trace in the clay base), to which its colour was possibly due.

(iii) The outer surface of 43/1,100 was very dark grey: and scattered fairly uniformly throughout the interior were occasional black particles, which proved to be carbon. It is possible that the pot was smoke-blackened during firing, intentionally or otherwise, since the particles of carbon in the interior were much more thinly distributed than those on the extreme surface. There was, however, an abrupt drop in the concentration of the carbon particles in passing from the high-carbon surface to the low-carbon interior: and this absence of a gradual transition suggests rather that the surface colour may be due to the application of a black wash.[2]

Notes on Methods and Materials.

Eleven samples of Egyptian Predynastic pottery were submitted, together with two samples of painted stucco, for identification of the pigments, etc. In addition, it was in several cases asked whether the surface pigment had been applied as a *wash* or as a *slip*: and, since these terms are used rather loosely in the literature, the following working definitions were given by the inquirer, to be used in the present investigation:

(i) *Wash.*—Colour applied to the pottery, in the "leather-hard" condition, simply by mixing the pure pigment with water, painting the design, and firing.

(ii) *Slip.*—Colour applied to the pottery, in the "leather-hard" condition, by making the pure pigment into a paste with clay and water. This was then applied either by painting, or by dipping the earthenware into the paste, and then firing the whole.

It was found in the present investigation, more than once, that the two definitions tend to merge into one another, a thick *wash* appearing like a *slip*. The method of differentiation

[1] The body material was of the fairly common type—pink at the two surfaces, merging gradually into a grey core due to incomplete carbonisation of humus or other organic matter in the clay (cf. A. Lucas, *op. cit.*, p. 326).

[2] Contrast A. Lucas, *op. cit.*, p. 321.

employed was to dissect out a sample of the coloured surface layer under the microscope, taking the very greatest care to avoid contamination with material from the underlying earthenware. Treatment with acid then completely dissolved a *wash* of, say, iron oxide, but left insoluble granules of silica, etc., in the case of a *slip*.

The Specimens.

No. 282/1,100 ("D." ware)

Question: "Identify pigment (may be red ochre, or umber). Is the yellow-green colour due to a slip or a wash?"

Report.—The yellow-green surface colour appears, under the microscope, as a thin irregular layer. A sample was removed, and was found (spectrographically) to have practically the same *qualitative* composition as a sample from the centre of the earthenware. The surface layer, however, contains a significant amount of chromium, to which the colour may be due: the earthenware itself contains only a trace. Further, a sample of the yellow surface layer, on boiling with concentrated HCl, was very largely insoluble, though a yellow colour appeared, due to dissolved iron oxide. It seems, therefore, that the yellow surface layer is simply a clay, of slightly different colour from that used for the earthenware itself: and there is no real differentiation, in this case, between a slip and a wash.

The brown pigment is iron oxide: and, since a sample carefully dissected out, and free from the underlying yellow layer, dissolved completely in conc. HCl, it must be regarded as a *wash*.

No. 284/I R 14 ("D." ware)

Question: "Identify nature of decoration (red ochre?). Check the nature of the surface."

Report.—On polishing a fairly smooth cross-section of this sherd, it was seen that the pink surface coloration diminishes smoothly and gradually as the pinkish-grey core of the sherd is approached. There is no sharply differentiated layer, as would be expected in the case of a wash or a slip; and a spectrographic analysis of the grey-pink centre and the pink surface showed no significant difference in composition. It seems probable that the earthenware was made up as a homogeneous mass, and that the graded colour was developed on firing, proceeding from the surface to the centre. There is no doubt, however, that the pink colour is due to iron oxide.

The red-brown design appears to be a *wash* of iron oxide, as a carefully dissected sample, free from the underlying earthenware, dissolves completely in conc. HCl.

No. 299/II G 11 ("D." ware)

Question: "Identify pigment."

Report.—The red-brown pattern is laid on by means of iron oxide. Examined microscopically, it appears as a very thin layer, and is apparently a *wash* rather than a slip, as a carefully dissected sample, free from the underlying earthenware, dissolves completely in conc. HCl.

No. 287/II J 12 ("P." ware)

Question: "Is the red surface due to a superficial polish, or to a coat of red ochre?"

Report.—There is little *qualitative* difference between the red surface and the centre of the

sherd, when examined spectrographically : but there seems to be no doubt that the red surface layer is due to a definite coating of iron oxide. When examined microscopically, a thin layer could be seen, perfectly distinct and apparently homogeneous, which could be flaked off separately. The colour seems to have been applied as a *wash*, as a carefully dissected sample free from underlying earthenware, dissolved completely in conc. HCl.

No. 288/1100 (" P." ware)

Question : " What is the nature of the red slip (?) inside (probably red ochre), and of the yellow-white wash (?) outside, if any ? "

Report.—The red-brown surface is apparently a *wash* of iron oxide. Examined microscopically, it is seen as a very thin layer, which can readily be flaked off from the earthenware, and dissolves completely in conc. HCl. The yellow-white layer on the outside, is also apparently a *wash*, this time of a much lighter coloured iron oxide (a yellow ochre) : a carefully dissected sample, free from the underlying earthenware, dissolves completely in conc. HCl.

No. 31/II M 8 (" C." ware). Pls. LIV and LII

Question : " Identify white pigment : if necessary, scrape off the white accretions. Also, is the red surface due to a superficial polish, or to a coating of red ochre ? "

Report.—As in No. 284, the earthenware itself has a pink colour which decreases progressively from the surface to the pinkish-grey core. There is in addition, however, a layer of red iron oxide on the surface which appears to be a *wash*. It is very thin, and not as definite as in previous cases, but careful dissection provided several samples of the red pigment which were almost completely soluble in conc. H.Cl.

Seen under the microscope, the white accretions mentioned in the query seem to be casual impurities, and not part of the white pigment used in the design. It was not found possible to dissect out a sample of the genuine white pigment, free from underlying iron oxide ; but one or two samples were obtained, only very slightly contaminated with the red pigment, which on spectrographic analysis showed silicon, magnesium, sodium, a little calcium, and some minor impurities. Apparently the white pigment is simply a layer of light-coloured clay : no differentiation between a wash and a slip is required, in this case.

No. 142/1500 (" C." ware). Pl. LVI

Question : " Was the white pigment (probably the same as in No. 31) applied before or after firing the mass ? "

Report.—This is an interesting sherd. At the inner (concave) surface, the pink colour shades off gradually as the grey-pink core of the earthenware is reached, just as in No. 284, but the purple-brown colour on the outer (convex) surface appears to have been applied as a *slip*. On examining a small polished cross-section of the sherd, a definite and fairly thick surface layer of purple-brown is seen on the outer surface, separated fairly sharply from the grey core : and, on dissecting out a sample of this, it was found impossible to obtain a specimen which was completely soluble in conc. HCl. Insoluble colourless grains (mostly silica, by their appearance) were always left after the iron oxide had been dissolved away.

The yellow-white pigment, from the design, had a " fat " greasy feeling in dissection. It appears to be a *slip* : for a sample, carefully dissected, and free from the underlying red slip, only partially dissolved in conc. HCl. Iron oxide (a pale variety, probably yellow ochre) dissolved out, and insoluble colourless granules of silica were left.

It was not felt that any definite conclusion could be drawn as to the stage in the firing when the yellow-white slip was applied.

No. 292/II N 8 (" S.B." ware)

Question : " What is the nature of the black fungus-like markings ? They have been reported upon by Kew as ' probably Dendrites . . . due to the infiltration of solutions containing iron and manganese '."

Report.—The explanation given by Kew (see p. 186) is certainly the most probable, as the branching, plant-like structure of the markings is typical of (for example) the black dendritic deposits of manganese dioxide in certain agates. It was not possible, in the present case, to obtain a sample of the black material rigorously free from the surrounding earthenware : but a sample of the latter, examined spectrographically, showed only a trace of manganese, while a sample of the black powder, scraped from the surface of the markings, showed the lines of manganese very strongly. (See Pl. L, Fig. 4.)

No. 43/1100 (" D." ware). Pl. LIV

Question : " Is there a black wash under the red decoration, and if so, what is it ? It might be smoke, but if so why has it not blackened the decoration ? "

Report.—Some attempt seems to have been made to produce a uniformly grey-black sherd here, for black particles are distributed haphazard throughout its entire bulk. They are, however, most concentrated at the outer (convex) surface : and some sort of final black coating must have been applied. The thinness of the coating suggests a *wash*, though a microscopic examination shows an irregular surface, partly clay and partly black particles. The pigment appears to be carbon, for on dissecting off a small sample, and heating to redness in a silica spoon, the black particles glow and then disappear.

Microscopic examination shows clearly that the red design has been laid *over* the black surface (which is exposed on cautiously scraping away the red pigment). The pigment is a *wash* of iron oxide, which is completely soluble in conc. HCl.

No. 293/1457 (C44b)

Question : " Identify the white pigment."

Report.—The white pigment is very loose and friable, and is easily dissected off. Analysed spectrographically, it was found to contain sodium, calcium, magnesium, aluminium, silicon and iron, as well as traces of minor impurities. It was partially, but not entirely, soluble in conc. HCl, and appears to be simply a light coloured calciferous clay.

No. 294/1581 (D8b)

Question : " Identify the red-brown pigment."

Report.—The red pigment is very loosely bound to the earthenware, and can be readily dissected away. It appears to be a *wash*, and consists of iron oxide, which is completely soluble in conc. HCl.

P. D. Ritchie.

Marks on an "S.B." Sherd, 292/II N 8.

By Sir Arthur W. Hill, F.R.S.

Predynastic potsherd from Armant with markings suggested to be due to the growth of a lichen or fungus. (Pl. L, Fig. 4.)

The specimen has been examined in the Godrell laboratory and we are of the opinion that the markings are probably "Dendrites" or "Dendritic Markings," which are due to the infiltration of solutions containing iron or manganese. These solutions subsequently evaporate leaving variously branched markings such as those on the specimen.

(The above suggestion is confirmed by Dr. Ritchie on p. 185. Ed.)

Analysis of Three Sherds from 1,000 and 1,100.

By Dr. H. E. Cox.

In order to determine the calcium, it was necessary to separate the silica, iron oxide and alumina, so I noted their quantities. The results are :

	161/III L 7 "S.B." ware	162/1, 100 "D" ware	163/I F 3 "D" ware
Silica	57·5%	50·0%	54·9%
Iron Oxide and Alumina	23·4%	32·2%	35·5%
Calcium Oxide	5·2%	14·0%	7·8%
	86·1%	96·2%	98·2%

The second two samples are different from III L 7, which evidently contains a good deal of magnesium and perhaps alkalies, as there is less alumina and less lime. I think its composition would be consistent with a Nile mud."

(The first specimen 161 is a typical example of what we have called *Nile-ware*, and the second two of *Desert-ware*, 162 being greyer and harder than 163. For a colour description of these see Dr. Scott Taylor's report below. Ed.)

The Colours of Some Predynastic Sherds.

By J. Scott Taylor.

For identifying the above I think that, if the colours in the Ostwald Colour Album[1] are used in conjunction with one of Winsor and Newton's charts giving the symbols for the complete system[1], there should be no difficulty in the specifications, and that considering the slight variations in the colour of such specimens at different points, the full Ostwald nomenclature should answer all purposes.

[1] *The Ostwald Colour Album.* Arranged by J. Scott Taylor, Winsor & Newton Ltd., London.

The colours on the specimens sent are :

Mark on Specimen		*Ostwald Symbol*
161/III L 7	"S.B." Ware	3·5 kf
163/I F 3	"D." Ware	
	Background	3 gc
	Decoration	6 lg
	Inner Surface	3·5 hd
295/III G 7	"S.B." Ware	4·5 ie
	Inner Surface	4·5 lg
	Scraped Edge	5 ic
162/1100	"D." Ware	
	Background	3 fd
	Decoration	8 mk
	Inner Surface	3 fd

It should be noted that the colours which are intermediate between those in the Album are judged by eye estimation, and that a Circle of 48 hues is used instead of 24. The Colour Circle then runs 1, 1·5, 2, 2·5, etc., instead of 1, 2, 3, as usual.

We cannot obtain colours for issuing a complete Ostwald Album, as the Ostwald Works only make 680 Papers, and cannot supply any others. A complete Album would require 2,535 Surface Papers, and the cost would be quite prohibitive.

For those not familiar with the *Ostwald Colour Album*, the following details may be of value. The numbers 1, 2, 3 etc., show the position of the Hue in the Ostwald Colour Circle ; the first letter the percentage of White in the shaded tint ; and the second letter the percentage of Black. For accurate interpretation the album should be used, but to assist the reader the percentages of Black and White represented by the letters is given here, together with names for the Hues. It should be understood that the names are only tentative as there is no standard nomenclature. The Hues form a circle so that 24 and 1 are intermediate between 23 and 2. The percentage of full Hue is obtained by subtracting the percentages of Black and White from 100. Thus 3kf indicates that the Hue of the specimen lies between Nos. 3 & 4 in the Ostwald Circle, and that it contains the same percentage of White as the Grey "k" (11%) and the same percentage of Black as the Grey "f" (72%). The balance (17%) is the percentage of Full Hue.

Numbers and Provisional Names of Hues in the Ostwald Circle	Percentages of Black and White in the Ostwald Greys		
		White	Black
1. Lemon	a.	89	11
2. YELLOW	b.	71	29
3. Amber	c.	56	44
4. Marigold	d.	45	55
5. ORANGE	e.	35	65
6. Scarlet	f.	28	72
7. Crimson (or Geranium)	g.	22	78
8. RED	h.	18	82
9. Amethyst	i.	14	86
10. Magenta	k.	11	89
11. PURPLE	l.	8·9	91·1
12. Violet	m.	7·1	92·9
13. Hyacinth	n.	5·6	94·4
14. BLUE	o.	4·5	95·5
15. Azure Blue	p.	3·5	96·5
16. Azure	q.	2·8	97·2
17. TURQUOISE			
18. Peacock			
19. Turquoise Green			
20. SEA GREEN			
21. Jade Green			
22. Grass Green			
23. LEAF GREEN			
24. Citron			

J.S.T.

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By Sir Arthur W. Hill, F.R.S.

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295/III G 7	"S.B." Ware	4.5 ie
	Inner Surface	4·5 lg
	Scraped Edge	5 ic
162/1100	"D." Ware	
	Background	3 fd
	Decoration	8 mk
	Inner Surface	3 fd

It should be noted that the colours which are intermediate between those in the Album are judged by eye estimation, and that a Circle of 48 hues is used instead of 24. The Colour Circle then runs 1, 1·5, 2, 2·5, etc., instead of 1, 2, 3, as usual.

We cannot obtain colours for issuing a complete Ostwald Album, as the Ostwald Works only make 680 Papers, and cannot supply any others. A complete Album would require 2,535 Surface Papers, and the cost would be quite prohibitive.

For those not familiar with the *Ostwald Colour Album*, the following details may be of value. The numbers 1, 2, 3 etc., show the position of the Hue in the Ostwald Colour Circle ; the first letter the percentage of White in the shaded tint ; and the second letter the percentage of Black. For accurate interpretation the album should be used, but to assist the reader the percentages of Black and White represented by the letters is given here, together with names for the Hues. It should be understood that the names are only tentative as there is no standard nomenclature. The Hues form a circle so that 24 and 1 are intermediate between 23 and 2. The percentage of full Hue is obtained by subtracting the percentages of Black and White from 100. Thus 3kf indicates that the Hue of the specimen lies between Nos. 3 & 4 in the Ostwald Circle, and that it contains the same percentage of White as the Grey "k" (11%) and the same percentage of Black as the Grey "f" (72%). The balance (17%) is the percentage of Full Hue.

Numbers and Provisional Names of Hues in the Ostwald Circle	Percentages of Black and White in the Ostwald Greys		
		White	Black
1. Lemon	a.	89	11
2. YELLOW	b.	71	29
3. Amber	c.	56	44
4. Marigold	d.	45	55
5. ORANGE	e.	35	65
6. Scarlet	f.	28	72
7. Crimson (or Geranium)	g.	22	78
8. RED	h.	18	82
9. Amethyst	i.	14	86
10. Magenta	k.	11	89
11. PURPLE	l.	8·9	91·1
12. Violet	m.	7·1	92·9
13. Hyacinth	n.	5·6	94·4
14. BLUE	o.	4·5	95·5
15. Azure Blue	p.	3·5	96·5
16. Azure	q.	2·8	97·2
17. TURQUOISE			
18. Peacock			
19. Turquoise Green			
20. SEA GREEN			
21. Jade Green			
22. Grass Green			
23. LEAF GREEN			
24. Citron			

J.S.T.

Chaff from Sherd 61/1,100, "R." Ware.

By Mr. L. A. Boodle.

The material on the slide includes (besides some reddish, apparently inorganic substance) remains of vegetable matter.

The recognisable portions are bits of the epidermis of a plant—almost certainly the epidermis of a Grass.

In a certain number of plants the epidermis is infiltrated with silica. Among Grasses the epidermis is usually strongly infiltrated so that when, for instance, a leaf is burnt, the cellulose is burnt away, but the silica component in the walls of the epidermal cells remains, retaining the form of the original cells.

Apparently, what you sent me is the siliceous residue of the epidermis.

(On receipt of some further specimens, Mr. Boodle sent the following additional note. Ed.)

I have examined some of the unmounted specimens and have been able to confirm the opinion I previously gave you.

The material is certainly the remains of vegetable matter, and certainly, in the specimens examined, consists of the siliceous residue of the epidermis of a Grass. Do you think that the part and kind of grass present is likely to be the straw of a cereal?

I heated two pieces enough to char the cellulose in the walls of the epidermis cells, should it be still present, but there was no blackening to be seen, so one can infer that the cellulose was burnt away during previous heating.

(T. Monod *L'Adrar Ahnet*, p. 177, says that modern sherds from Tidikelt show "l'emplacement de brins de paille très tenus et plus ou moins calcinés," and on p. 179, describing some stone age pottery from the Sahara (L'Abri sous roche d'Adoukrouz): "un fragment est si peu cuit que la tranche est restée grise et que l'on y observe des fétus de paille non carbonisés." Ed.)

L. A. B.

DISTRIBUTION.

The whole of the Settlement material is in Manchester except the following:

82 Flint implements (Unfigured)	Cairo 57588/672
1 sherd of "P" ware	Cairo
1 „ „ „ „ (rim burnishing)	
1 „ „ "B" „	
1 „ „ "T" „	
1 „ „ "R" „	
3 figurines of torso and head of bulls	Cairo 57551/2
1 model of goose (Pl. LV, fig. 6, No. 108)	„ 57548
1 „ „ phallus	„ 57550
1 frag. pottery boat	„ 57549
1 flat pottery hand "mould" (Pl. LVI, fig. 1, No. 123)	„ 57547
1 frag. modelled pottery	„ 57553
2 spindle whorls	„ 57554/5
1 model pig (?) (Pl. LV, fig. 6, No. 109)	
Flints (all unfigured)	University Museum, Cairo.
„ „ „	British Museum, Dept. of British and Mediæval Antiquities, 1936/1–6, 1 *et seq.*

The following sherds were destroyed in examination:

272/I E III and 286/ I K 7.

The sherds examined by the Courtald Institute of Art (Scientific Department) have been given to that institution:

282/1, 100, 284/IR13, 40/IIG11, 287/IIJ12, 288/1, 100, 31/IIM8, 142/1,500, 292/IIN8, 43/1,100, 293/1457, 294/1581.

Prof. W. J. Rees, of the Department of Applied Chemistry, University of Sheffield, is very kindly examining nine sherds:

266/IL12, 269/IL13, 247/IE3, 277/IIM8, 279/IIO12, 283/1100, 289/IIIK14, 290/IH14, 291/1000.

The following sherds, which are figured or mentioned in this section, though not from the Settlement, have also been sent elsewhere than Manchester. The Ashmolean Museum, Oxford: 126/Ar.X, 132/1300, 129/Buch.X. The Queen's College, Oxford: 133/Ar.X., 125/Baq.R. Royal Ontario Museum, Toronto: 131/1300.

Ed.

CHAPTER XIII

MISCELLANEOUS OBJECTS

A MOST remarkable fact about the settlement was the total absence of beads, despite the fact that almost the whole of the deposit was sieved. Apart from pottery and flint implements, very few objects were discovered. Although there were no beads, the inhabitants evidently adorned themselves, since several fragments of slate palettes were found. (These are marked on the register charts.) The only typable fragment, from I M 14, is shown on Pls. LIII and LVI, No. 145. It is decorated with two or more birds' heads, similar to classes 69–80 in the *Pre. Corpus*, which have a wide range of date. Several *Spatha Rubens* shells, and fragments of shells, were found, including a group of ten complete specimens from III O 12. It may be presumed that most of these were used to hold powdered malachite, since when found in tombs they are usually stained green with this mineral. Some other varieties of shells were found, probably from ornaments, and these are recorded in the register charts. The corner of a flat slab of sandstone was found in I N 11, stained red, probably with red ochre. The red ochre may have been ground for pot burnishing but, as no kilns were found nearby, it is more likely that it was wanted for the manufacture of cosmetics.

A sard pebble from I K 10, Pl. LVI, Fig. t, No. 150, with a high sand polish, was perhaps picked up simply on account of its attractive colour and lustre, or may have been collected for manufacture into beads. The same is true of the calcite crystal, No. 149. A small incised fragment of limestone, No. 151, if contemporary, is interesting, and style of cutting points to its being Predynastic, but, coming from 1,100, its date is uncertain. A drawing of the fragment is on Pl. LIII. A natural cup of sandstone, No. 143, also from 1,100, was probably picked up because of its shape, and may even have been used. No. 144, a natural lump of soft laminated stone, bears some resemblance to a crocodile—as the children on the work pointed out—and the same resemblance probably struck the Predynastic people. The flat circular fragment of naturally red sandstone from I G 12, No. 148, was included in the photograph because the red was thought at the time to be ochre staining.

The three fragments of shell bangles, Nos. 152–154, from I K 10, III M 11, and 1,100, are almost identical in type with those from tomb 1579, shown on Pl. XLVI.

The three bone points, Nos. 157–159, from I M 7, I M 8, and III M 9, require no comment.

Two copper pins, Nos. 155–156, have not been analysed, but their material may be accepted. The cleaned specimen, No. 156, probably had a loop at one end like the corroded specimen. From examination of a gazelle skin garment from tomb 1483 (p. 133) we know that the needles used for this work were very fine (about the size of a modern " 10 " which is less than 0·5 mm. thick) whereas the clean pin is more than 4 mm. in thickness at its widest part. It is probable that these pins were used as ornaments or for dress fasteners. Drawings of them are on Pl. LIII.

O. H. M.

CHAPTER XIV

THE FLINT INDUSTRY[1]

By S. A. HUZAYYIN.

(*Egyptian University, Cairo*)

SECTION I: INTRODUCTORY: THE VALUE OF SETTLEMENT STUDIES.

THE study of the Predynastic phase in Egypt has made marked advance within the last decade or two. Up to then, the study of this phase was largely in the hands of Egyptologists whose approach to the subject was not always strictly in harmony with that of the prehistorian. In recent years, however, a number of prehistorians have entered the field bringing with them fresh methods of stratigraphical, technological and typological investigation, coupled, in certain cases, with a physiographic survey of the areas concerned. This did not fail to contribute appreciably to our knowledge of the period. The advance has also been enhanced by the fact that recent work has been mostly concerned with " settlements " rather than " cemeteries." The conclusions reached by earlier workers were largely based on evidence from grave materials, as (apart from those relating to the very eve of the Dynastic era) the settlements were either too insignificant or inadequately investigated. Although therefore these conclusions constituted a distinct contribution in themselves, they can have hardly claimed to afford a complete picture of the period they covered. The material found in a cemetery may give an idea about the life, customs and beliefs of the people, but frequently this idea is incomplete and may be even misleading. The remains recovered from the graves of the richer minority of a human group (as represented in a cemetery) are usually out of proportion to those yielded by the poorer graves of the majority. Unless carefully weighed they may have a misleading effect upon the picture that is reconstructed of the general standard of the material culture of the group as a whole. It may be even argued that in spite of the fact that objects of everyday use and actually utilised articles are often found amongst offerings, there is sometimes the danger that a grave assemblage might represent life " as it should be " and not quite as it is in reality. A sufficiently accurate idea about the " *genre de vie* " of a human group can perhaps better be obtained through a

[1] The present treatment of the flint industry of the Armant settlement is entirely based on museum work. The writer did not take part in the excavations. He is deeply indebted to the authorities of the Egypt Exploration Society for having kindly put the material at his disposal for study. To the generosity of Sir Robert Mond is due the series of illustrations without which it would have been virtually impossible to describe the industry or to convey any correct idea about its technological details. To O. H. Myers is due the original suggestion of a detailed study of the collection; and he has also offered kind help and made a number of valuable suggestions both during the work on the material and the writing of the text. The writer's gratitude and thanks are also due to the authorities of the Egyptian University, Cairo, for granting him leave to work on the collection, and to Dr. J. W. Jackson, of the Manchester University Museum, for offering space and help during the work.

thorough and careful investigation of a " settlement " of its living members. Such a study would not only be of a positive value in itself but it would also offer a " check " on the grave data. This is probably the reason why the results arrived at from the study of settlements in recent years, while essentially confirming those of the grave evidence, are already introducing new elements in our conceptions and interpretations of the culture complexes and interconnections during the Neolithic and post-Neolithic (or Chalcolithic) of Egypt. The new changes are perhaps not least marked in our ideas about the flint industries and technique of these phases. Whereas a large proportion of the graves excavated have yielded pottery of some sort or other, flint implements were found only in a comparatively small number of graves.[1] It is true that the flint groups recovered from graves contained both exceptionally fine specimens (fishtail, and rippled knives, etc.) and very crude and atypical ones (chips, rough flakes, cores, etc.), but the material yielded by any particular area or group of cemeteries was never large enough to establish a continuous and sufficiently detailed technological sequence. The result was that workers have been forced to depend very largely on the pottery for dating purposes. This may admittedly be quite a legitimate and safe method, but when it comes to applying a single system of Sequence-dating to such widely separated areas as the confines of the Delta and the southern parts of Upper Egypt, the desirability of establishing some sort of check on the typological data of pottery becomes all the more evident. It is almost certain that at least during the latter part of the Predynastic phase there was extensive commercial and cultural intercourse along the lower reaches of the Nile, but at the same time we have no guarantee that even then " local " factors did not play some part in the differentiation of local facies of culture. In this respect, it should be remembered that the fact that pottery can be more easily traded and copied renders it less reliable in determining the local differences of industries and cultures over wide areas. In other words pottery types may be useful for purposes of dating and correlation but actually somewhat misleading in tracing patterns of local culture. Needless to add that in attempting to obtain a sufficiently balanced picture of the culture complex of a region like the Lower Nile Valley it is as necessary to know the elements of local differentiation as those of general and wide correlation. The value of the former can best be appreciated through the study of settlement remains whose local origin and manufacture can be more definitely established. In this respect, the flint industries may perhaps be of more help than any other class of remains. Certain types of implements may have been traded or copied, but in any case this could not have been so easy as in the case of pottery, beads, ornaments or other classes of remains. There are ample indications in nearly every settlement thus far studied that the greater part of the flint industry was worked locally (either in the settlement or at some nearby flaking site), and, in so far as possible from local material.[2] Even in cases when types from other settlements were copied the actual execution and final result were largely governed both by the skill of the copier and the nature of the material available. Indeed it may be safely argued that a careful and sufficiently detailed comparative study of the flint industries in the settlements of Upper and Lower Egypt would very probably show that even in cases where special classes of implements were outwardly similar in " type " and " form," their " technique " may show interesting

[1] On an average, not more than 1 in 20 of predynastic graves have yielded flint artefacts (and these are even somewhat restricted in types). See W. M. Flinders Petrie (1901), p. 23, and G. Caton-Thompson (1928), p. 70. (For full titles of these and other references mentioned in the footnotes, see list at end of present chapter).

[2] On the evidence of the local manufacture of the flint industry of the Armant settlement *vide infra* Section iv.

differences of highly illuminating value.[1] It is for these and other reasons that the study of the flint industries in settlements may be of singular help in trying to trace the complex nature of cultures which may outwardly (and from the study of certain tradable and easily copied classes of remains) seem homogeneous.

Section II : Previous Settlement Studies.

But before we start on the study of the flint material from Armant it may be fitting, for purposes of reference and comparison, to give a short account of the settlements thus far excavated and studied with special reference to their flint industries. Such a synopsis is made all the more necessary by the fact that there is so far no such comprehensive account of the late prehistoric flint industries of Egypt which can be used as a Corpus on the same or similar lines as that of the pottery. For purposes of convenience and clarity we shall divide the settlements to be mentioned here into two groups : the truly Neolithic ones and those which belong to the post-Neolithic phase. Each of these groups will be dealt with in turn, starting with N. Egypt.[2]

We may perhaps best start with the Neolithic culture of the Fayyoum (Fayum), not so much because it represents one of the earliest industries thus far discovered in Egypt, as because it has been better studied and published than any of the other prehistoric cultures of the country. Thanks to recent work by G. Caton-Thompson and E. W. Gardner this culture has been well surveyed in its physiographic setting.[3] The early facies or Fayyoum A is associated with the 10 m.-level (above sea) of the lake, and its remains have been found in a number of small middens scattered along the former shore. The people seem to have lived on a combined system of agriculture (both emmer and barley), fishing and hunting ; but domestication played only a negligible part in their economy.[4] From the small size of the middens it may be surmised that in spite of the relatively high standard of civilisation, the conditions of the *milieu* and the particular type of social economy did not favour the rise of relatively large settlements (of the type we shall see a little later). It is also interesting to note that in spite of the wide commercial relations (as shown by the existence of Red Sea and Mediterranean shells)[5] no trace of copper has been found. Indeed it has been safely assumed that we are dealing here with a truly " Neolithic " civilisation. The pottery is rather crude and is characterised by a special type of rectangular dishes with peaked rims.[6] The flint industry which concerns us here is, on the other hand, particularly rich and diversified in its classes.[7] It includes ground and polished axes of igneous and other sedimentary rocks (especially nummulitic limestone) as well as flaked (or

[1] This is not to deny, however, that in a large measure " type " is often the outcome of " technique."

[2] In the present work the term N. Egypt has been often used instead of L. Egypt (though this latter has also been used occasionally). N. Egypt is a convenient term because it includes, not only the Delta (about which we know practically nothing from the point of view of prehistoric archæology) but also its confines, including the Fayyoum. The term S. Egypt has, however, not been substituted for that of Up. Egypt, as the former may perhaps involve Nubia.

[3] See especially their works (1929) and (1934).

[4] The middens are conspicuous by the scarcity of the remains of sheep and goats and the absence of their dung. For possible reasons for the negligible role played by domestication in the Fayyoum civilization see G. Caton-Thompson and E. W. Gardner (1934), p. 89.

[5] See G. Caton-Thompson and E. W. Gardner (1934), pp. 87–89.

[6] On the pottery see G. Caton-Thompson (1928a), pp. 70–89, and G. Caton-Thompson and E. W. Gardner (1934), p. 35.

[7] On the flint industry see G. Caton-Thompson and E. W. Gardner (1934), pp. 19–22.

sometimes polished and re-flaked) ones of flint and chert. A number of adzes of diminutive size also occur. The industry is also characterised by arrow-heads which are triangular in shape or with slightly hollow or deeply concave base. Bifacial sickles (some having a bevelled, chisel-like transversal end) and bifacial leaves and points (daggers, javelins, spears) are abundant. Some of the leaf-knives or points are made of sheets of tabular flint which still retain patches of the original cortex on either side. An interesting type of polished and re-flaked points or daggers is also known. Taken as a whole, the industry may be therefore regarded as representing a combination of two techniques ; namely the grinding and polishing on the one hand, and the bifacial flaking on the other. Although the two techniques remain separate their combination in certain types of implements is an indication of their thorough fusion. The dual character of the industry may be therefore regarded as in some way rather superficial.

The Fayyoum B facies (associated chiefly with the 4 m.-level of the lake) is less characteristic than its predecessor ; and in a sense it represents a phase of degeneration.[1] Unfortunately no pottery is known and this is a handicap in assessing the nature of the culture complex of this phase. The flint industry, however, is only partly related to that of the early facies (from which it appears to differ in certain marked characteristics). The polishing technique seems to have dwindled and no polished axes or adzes are reported. This class is confined to flaked types partly resembling hoes and celtiforms. The polishing and re-flaking, however, continues in certain types of gouges. At the same time the bifacial technique seems partly to have gone out of use. Very few of the fine bifacial sickles of the A facies are found. On the other hand, there is a profusion of partially bifacial knives including the so-called pebble-butted and pebble-backed types. Largely unifacial planes become more abundant. As to arrow-heads, all types common in the Fayyoum A disappear almost entirely and their place is taken by the tanged variety. In addition to these changes the industry has apparently got into contact with some microlithic (surviving Final Palæolithic ?) facies which have recently settled in the area.

The Fayyoum A, however, is not an isolated culture. Recent excavations at the Neolithic site of Marmadat Bani Salamah (or Merimde Benisalâme) on the western edge of the Delta have yielded a civilisation which may be related, in all its essentials, to the same cultural and presumably also chronological phase as the early facies of the Fayyoum.[2] The settlement covers a large area (approx. 600 × 400 m.) and the deposits are of exceptional thickness (3 m. and more in various parts).[3] The pottery it yielded is somewhat crude though in certain respects

[1] See G. Caton-Thompson and E. W. Gardner (1934), pp. 57–8.

[2] See H. Junker (1928), 1929), 1930), 1932), and (1933). There are, however, certain marked differences (of both an ethnographical and a socio-economic character) between the cultures of Fayyoum and Merimde. The latter is a settlement of large dimensions and contains the graves of the dead within it. The Fayyoum settlements are small and have yielded no graves. It has even been shown recently that at Merimde we are dealing with a proper village in which huts were built according to a " plan " along a central lane (a feature held to be the earliest of its kind thus far discovered ; see H. Junker, 1933, pp. 57–60). This is the sign of a high social organisation. Also domestication and especially pig culture played an important part in the social economy of the society while, as we have just mentioned, domestication was not important in the Fayyoum. Although certain differences between the two cultures may be explained by varying conditions of the *milieu*, the exact chronological relation of each of them to the other still needs precision. In this respect it should be remembered that though Merimde was culturally more advanced than the Fayyoum A, it may not have necessarily been later in date than the Early Fayyoum. Merimde, however, may have lasted after the decline of the Fayyoum A facies.

[3] On a comparison of the size of this settlement with other Up. Egyptian ones see H. Junker (1930), pp. 28–30.

it represents an advance on the Fayyoum material.[1] The flint and stone industry is of a varied character.[2] Of special interest and importance is a large series of polished axes and adzes.[3] The polishing technique is even represented by a unique specimen of a ground and polished dagger.[4] Other weapons include mace-heads of the pear shape[5] and a large number of bifacial artefacts. Arrow-heads are mostly hollow based, but the tanged type is also represented.[6] There are also triangular javelin- or spear-heads. Long triangular and square-based bifacial sickles are specially abundant ; and so are the other bifacial tools, especially knives. On the other hand, the unifacial or blade industry is very scanty. A number of exceptionally crude core tools (sling-stones and picks), however, was present and to this reference will be made when we deal with the Armant material.

Another settlement recently discovered on the confines of Lower Egypt is that of Ma'adi.[7] This is another giant settlement extending along nearly 1½ km., and with deposits reaching 160 cm. Its culture, however, belongs to a much later phase which may be tentatively equated with the last Predynastic stage, though it perhaps started a little earlier. Copper is represented both by tools and by lumps of ore. The pottery is of a richer variety than at Fayyoum or Merimde and it seems to indicate some connections with Syria-Palestine.[8] The flint industry is much more interesting from our present point of view.[9] Taken as a whole the technique is entirely different from that of the Neolithic of Fayyoum A and Merimde. No grinding or polishing has thus far been recorded. Also the bifacially flaked tools are comparatively rare.[10] The typical triangular and hollow-based arrow-heads of the Neolithic of N. Egypt are entirely absent, and it is interesting that their place is taken by a tanged " pistiliform " (or " pistilliform ") type which, in Upper Egypt, may be attributed to the Early Dynastic phase.[11] The blade industry of the settlement is almost entirely unifacial. The blades are either left entirely without any lateral retouch or have one or both of their edges trimmed on the upper face. A few specimens, however, have " alternate " lateral retouch, i.e. one edge worked on the upper face and the other on the flat one. Borers are abundant and are either of the long blade (or " *limace* ") type or of the prismatic rod-like variety. Scrapers offer another class with rich variations.

[1] Apart from various vessels, there are fragments of handles and also of mud figurines. For an account on the pottery and mud-work of Merimde, see H. Junker (1929), pp. 226–237, (1930), pp. 72–73, and (1932), pp. 68–81. References to comparison of the pottery of Fayyoum and Merimde also in G. Caton-Thompson and E. W. Gardner (1934), p. 92.

[2] On this see H. Junker (1929), pp. 177–178 and 219–223 and (1930), pp. 61–71.

[3] In the three first seasons alone (up to 1930) the settlement has yielded 28 specimens, i.e., more than those yielded by all Up. Egyptian cemeteries put together or even by Nubia. For comparisons on the occurrence of polished axes in various parts of Egypt see H. Junker (1930), pp. 62–64.

[4] See H. Junker (1930), Taf. VIII.

[5] It is interesting that this pear-shaped type does not appear in Up. Egypt until early Mid. Predynastic times. It was preceded there by the disc-form. See W. M. Flinders Petrie (1920), p. 22.

[6] See H. Junker (1929), Abb. 3 and Taf. VIIIa, and (1932), Taf. IVa.

[7] See O. Menghin and M. Amer (1932), and O. Menghin (1932c), (1932d), and (1934), and M. Amer (1932a) and (1933).

[8] See O. Menghin (1934), p. 113.

[9] On the flint industry see O. Menghin and M. Amer (1932), pp. 38–45, and Pl. XLIX–LXXI.

[10] Though a fairly well finished specimen of a fish-tail knife or lance has been recorded. See O. Menghin (1934, Taf. XXa).

[11] See O. Menghin and M. Amer (1932), Pl. LVI, Nos. 12–13. For specimens of this type from Up. Egypt see W. M. Flinders Petrie (1915), p. 124 and Figs. 203–205. The term " pistiliform " was first used to designate this type in Egypt (and also parts of N.W. Africa) by H. Breuil (1931), pp. 87–90.

They include the flat tabular type known as the "*racloir en éventail*,"[1] which has not so far been recorded in Egypt and has its only parallel in what appears to be Early Bronze in Palestine.[2] Amongst other tools of special interest is the burin, which appears to be represented by a small number of specimens (not yet published). But apart from all these relatively fine classes of tools, the industry has also yielded a group of exceedingly crude artifacts which have been termed as the "Ma'adi cores."[3] These Palæolithic-like tools are of special interest as they throw useful light on the complexities of the flint technique even during this late phase of the Prehistoric cultures of Egypt. This question will come up for discussion at a later stage.

In Upper Egypt stratified settlements referring to the true Neolithic phase have not been found as yet. Up to now, this phase is represented only by the little known Tasian civilisation, whose published material appears to come entirely from graves or grave areas.[4] The flint industry of this civilisation is, however, not without interest. The polishing technique, so characteristic of the Neolithic of the North, is also known here. We may mention particularly the existence of two polished axes of siliceous limestone, identical with specimens from Merimde and Fayyoum, and also with a piece recently discovered in the Khargah Oasis.[5] Other flaked but unpolished axes and adzes also occur. Among implements found by G. Brunton at Mustagiddah (Mostagedda) were tranchet-axes which had their working end re-edged by means of a transversal blow.[6] These are also associated with crude knives or choppers made of tabular flint and worked only along their edges.[7] The bifacial technique in knives is very scantily represented and there appears also to be a number of simple flakes and blades. In the present state of our knowledge, however, no more precise information is available.

The Badarian phase which appears to follow immediately on the Tasian (and to mark the beginning of the Chalcolithic) is also represented largely by grave data, though a certain amount of material has been found in scattered remains of settlements.[8] The pottery need not engage us here, though it may be mentioned in passing that in fineness and finish it was never surpassed

[1] For illustrations of this type see O. Menghin and M. Amer (1932), Pl. LXVIII, 2 and LXIX, 1–2, and O. Menghin (1934), Taf. XXI a and b.

[2] See R. Neuville (1931), pp. 4–5 and Pl. III.

[3] See O. Menghin and M. Amer (1932), p. 45 and Pl. LXXI.

[4] See S. Gabra (1930); also forthcoming publication by G. Brunton of material from grave areas and their camp sites discovered more recently near Mustagiddah.

[5] For Tasian specimens see S. Gabra (1930), pp. 155–6; also reference in G. Brunton (1929), p. 466. For Merimde see H. Junker (1930), pp. 65–66, and for the Fayyoum and Khargah specimens see G. Caton-Thompson and E. W. Gardner (1934), p. 26. In all these places (except Khargah) these limestone axes are accompanied with celts of igneous rock.

[6] These pieces are now in the British Museum (London) and their registration numbers are :—1930—5.9—6, 10, 11 and 13, with field numbers as $\frac{1928,}{100,}$ $\frac{28,}{300,}$ $\frac{28}{2000,}$ and $\frac{28}{2800,}$ respectively. Mr. Brunton has kindly informed the writer that the first and third specimens were found in village or camp remains of mixed Tasian and Badarian, the second in Predynastic village remains, and the last in exclusively Tasian remains. The sites in which these implements were found will be published by G. Brunton in his forthcoming *Mostagedda*. For difficulties in fixing the exact cultural and chronological place of these re-edged axes, however, *vide infra*, when we come to deal with similar specimens from Armant.

[7] Specimens of these knives are in the Manchester University Museum, registration numbers 8746, 48, 49 and 50, with field numbers $\frac{29,}{3300,}$ $\frac{29,}{3500,}$ $\frac{29}{3801}$ and $\frac{29}{5100}$. Another series is in the Museum of Archæology and Ethnology, Cambridge. In spite of their crudeness and of the difficulty in fixing their exact chronological status, these knives remain of particular interest from the technological point of view.

[8] See G. Brunton and G. Caton-Thompson (1928); also G. Brunton (1929).

by that of any other culture in Egypt, either before or after the Badarian.[1] The flint industry is also of a highly specialised character. The technique differs from that of the true Neolithic in that it seems to lack the grinding and polishing.[2] On the other hand, the bifacial pressure-flaking is developed to a remarkable degree. Bifacial sickles of either long triangular or double-pointed shape are well represented. They usually have the denticulation on one edge, though some of them have two sawing edges. Arrow-heads belong to the hollow base type and are similar to those of the Fayyoum A. Besides these there are javelin-heads of a double-pointed type whose exact parallel has thus far been found only in the Khargah region of the Libyan Desert.[3] Other less characteristic artifacts include knife blades, simple flakes and a number of cores.

The Predynastic phase proper (that is from Early Predynastic IV or Amratian onwards) is represented in Upper Egypt by a number of settlements, though very few have thus far been properly worked out. Of these latter the N. Spur of Hemmamiah (or Himmamiah) deserves special note.[4] The excavated part of the settlement is only about 40 × 50 m., but it yielded stratified midden of over 2 m. in thickness. The flint industry shows marked differences from that of Badari which it supplanted on the site. The bifacial technique is very poorly represented and its place is taken by an almost entirely unifacial industry. Blade-knives, discoidal and long scrapers, and blade-sickles abound, especially in the higher levels. Some of the knives, however, follow what G. Caton-Thompson considers as originally a Badarian tradition. These are small blades with their tip trimmed or truncated obliquely on the upper face.[5] This class is of special importance and reference will be made to it later on. The rest of the knives, however, are of an unmistakably Predynastic character. Of special interest is the class with alternate lateral retouching on its edges (that is one edge worked on the upper face and the other on the flat one) which, so far as we know, does not occur below the 3-ft. level. The scrapers include in the lower levels (3 ft. 6 in. and below) high core (or hoof-shaped) types which may be also regarded as Badarian survivals.[6] In the upper levels, however, they belong entirely to the end-of-blade and ovoid types. As to the blade-sickles, they belong to a number of varieties, though they all have the denticulation on one edge. There is also a small number of hollow-base arrow-heads and atypical points and a fragment of pear-shaped mace-head. Other tools of special interest include two fish-tail knives which throw useful light on the use of this special class of tools in daily life.[7] The settlement may be broadly dated as Early (i.e. Amratian) and Middle Predynastic.

Other settlements in Upper Egypt have either been properly excavated but incompletely published (so far as the flint industry is concerned); or inadequately excavated, and thus lost most of their scientific value. Amongst the former group we may mention in passing Mahasnah

[1] See G. Brunton (1929), p. 363.

[2] One polished axe of hard green stone (G. Brunton, 1928, Pl. LVI, 3, also p. 3) has come from a grave pit (Cemetery 1,100) which did not yield any other remains and whose date cannot be fixed with certainty.

[3] For Badarian specimens see G. Brunton (1928), Pl. XXIX, 6; and for Khargah specimens see G. Caton-Thompson (1931), Fig. 1, p. 78.

[4] See G. Caton-Thompson (1928).

[5] See G. Caton-Thompson (1928), p. 76 and Pl. LXXXIII, 129–135.

[6] See G. Caton-Thompson (1928), pp. 75–6 and Pl. LXXXII, 142–3; LXXXIII,161; LXXXIV, 183–4; LXXXV, 206–7.

[7] On this latter point see G. Caton-Thompson (1928), p. 77.

and Abydos.[1] Mahasnah is a much disturbed settlement whose material may be roughly regarded as Early (i.e. Amratian) and Early Middle Predynastic. It yielded a polished axe, forked and hollow-based arrow-heads, mace-heads (apparently both discoidal and pear-shaped), some bifacial and blade-sickles and a number of scrapers of various kinds.[2] Abydos, on the other hand, belongs to the very close of the Predynastic phase, and its material is mostly made up of blade-knives with squared or rounded scraper-ends, blade-sickles and a special class of microlithic borers with steep lateral trimming on the boring part.

In Nubia a camp settlement (Meris Markos) which may be equated culturally (on the evidence of pottery), though not necessarily chronologically, with the Late Predynastic or Proto-Dynastic phase, has no special feature except for the fact that it yielded nine ground stone celts of a type which is so rare in Upper Egypt proper.[3]

But before we turn to Armant we must refer to other middens, which, though inadequately investigated, bear special connection to our settlement; namely Toukh (near Naqadah) and Nag' Hammadi. The former represents the first midden-mound to be dealt with in a responsible though unfortunately inaccurate manner.[4] It yielded at least one polished diorite axe[5]; but the flaked and re-edged flint axes are more typical of the industry.[6] A number of the transversal flakes which have been struck off the working edges of these axes have also been found. Other bifacial tools, however, are relatively scanty and include some bifacial leaf-points or knives, bifacial sickles, and a number of triangular, slightly hollow-based and forked arrow-heads.[7] The majority of the knives and sickles, however, appear to belong to the blade class.[8] Another interesting class of tools are recognised by de Morgan as "*pointes de type chelléen*," which represent (in his view) survivals from the Palæolithic.[9] The technique of this particular class of tools, however, will be dealt with at a later stage. Other tools which he describes as "*hachettes*" appear to belong to the typical plane class (to which reference has already been made in the Fayyoum B).[10] It is also thought[11] that "burins" are included amongst the reject flakes which this author calls "*éclats de taille*." And finally it may be interesting to note that, so far as can be ascertained, no mace-heads were found in the settlement.

The last settlement (or group of sites) for us to mention is that of Nag' Hammadi.[12] The station from which surface material (and material found in profusion on the surface) has been collected by Ed. Vignard, is thought to extend over the area of one hectare. The material collected is entirely made up of flint instruments (with no pottery), chief amongst which are

[1] On the former see J. Garstang (1903), pp. 5–9. On the latter see T. E. Peet (1914), pp. 1–13 and Pl. III.

[2] Judging only from photographs on Pl. III (in J. Garstang, 1903), it appears that triangular planes may have also been represented.

[3] See G. Reisner (1910), pp. 215–218.

[4] This early work was done by J. de Morgan, who unfortunately gives only fragmentary and miscellaneous data in his works (1896) and (1897).

[5] See J. de Morgan (1896), Fig. 83, p. 98.

[6] J. de Morgan (1896), pp. 92–96 and Figs. 59–75, and (1897), pp. 115–116; also on this type of tools *vide infra*.

[7] On these latter see J. de Morgan (1896), pp. 127–132.

[8] For types of blade-sickles from Toukh see J. de Morgan (1897), Figs. 267–273.

[9] J. de Morgan (1897), pp. 5–6 and Figs. 6–7.

[10] See J. de Morgan (1897), Figs. 345–346. Also coll. of the Inst. de Paléont.hum. (Paris) specimens registered as from Toukh.

[11] See reference in Ed. Vignard (1929), pp. 300 and 306.

[12] Ed. Vignard (1921), pp. 1–20 and Pl. I–XVI and (1929), pp. 299–306 and Pl. I–V.

the burins and the flaked and re-edged axes. The burins include practically all the varieties of the Upper Palæolithic of Europe together with a special type of so-called "transversal burin."[1] The latter has its facet struck transversally across the main axis of the blade (*vide infra* for further explanations in connection with Armant material). Altogether out of the 2,000 pieces collected, some 800 are held to be burins—an unusually large number and proportion.[2] The flaked axes seem also to have been mostly re-edged (like those of Toukh), a process which Vignard calls as "*avivage*."[3] With these were found the re-edging flakes or "*éclats d' avivage*" (*vide infra* for further descriptions and illustrations). Other tools represented are a number of ordinary scrapers (side and end types of both ovoid and elongated shapes) and blade-knives with lateral retouch. Two fragments of bifacial daggers and a single blade-sickle were also found.[4] And lastly we may mention that a crude specimen which the author calls "*poignard*"[5] resembles dibbles which have also turned up from Armant (*vide infra*).

The question of dating the Nag' Hammadi station has led to a good deal of confusion. On the evidence of the burins, Vignard has strongly advocated that we are dealing with an "Aurignacian" industry. In this he seems to be following a purely typological line of correlation—a process which is not entirely safe when we are dealing with such widely separated regions as W. Europe and Egypt. In doing so he does not even adopt a balanced view of the typological evidence with all its related data, as he overlooks the evidence afforded by the bifacial specimens, the blade-sickle and the axes. Furthermore, it should be noted that in recent years considerable doubt has been shed—as we shall attempt to show later on—on the value of the main type of tool found at Nag' Hammadi (i.e. the burin) for dating. In fact, evidence will be adduced in due course to show that far from representing a facies of the Aurignacian—an industry whose true representatives have so far not been recorded in Egypt—the Nag' Hammadi settlement or flaking station belongs to the same industry and culture phase as our new settlement of Armant.

Section III: General Conditions of the Armant Settlement and Material.

We may now pass on to Armant. The details of the conditions and general lay-out of the settlement have already been given in a preceding chapter, and we need give here only those that may concern us in connection with the flints. The settlement lies on the edge of the present cultivated land and the desert and was revealed by digging earth for brick-making. It has two main areas (see Pl. LXXV) marked as 1000 and 1,100 respectively. The first of these covers some 436 sq. metres and has been methodically excavated throughout. It yielded a deposit of 3 levels (marked as I, II and III, the latter being the lowest) of some 15 cm. each. It was divided into squares of 2 m. each, as indicated by letters and figures on Pls. LXIX and LXXVI–LXXVIII). Each piece of the material found in a square was registered by the Roman number of the Level and the letter and figure of the square, e.g., I J14, II M 8, III B 4, etc. In addition to this a number of pieces (including flint and other material) whose *exact* position within a square has been fixed (Pls. LXXVI–LXXVIII) have been registered by a serial

[1] On burins see Ed. Vignard (1921), pp. 5–10 and Pls. II–IX.

[2] Ed. Vignard (1929), p. 299. Of the burins "plusieurs centaines" are said to be of the unique transversal type.

[3] Ed. Vignard (1921), pp. 10–11 and Pl. XIV–XV.

[4] Ed. Vignard (1921), Pl. I, Nos. 2–3 and 1 respectively.

[5] Ed. Vignard (1921), Pl. I, No. 4.

numbering (from 1001–1086 in the case of the flints). These field registrations have been maintained in the present work. According to the excavators' report, this levelled part of the settlement was largely undisturbed except for a number of Roman intrusions and Coptic baby-graves. Roman disturbances took place in Levels I–III in squares L 8, L 9, L 10 and M 8, M 9 and M 10. It did not occupy more than small patches within these squares but, of course it has to be taken into account. Roman sherds were also found in Levels I and II only in the following squares: A 2, A 3, B 1, B 3, B 5, C 1, C 3, C 5, C 6 and D 1. The Roman or Coptic babies marked on the plans (Pls. LXXVI–LXXVIII) in no case descended to Level III. They occurred in Level II (and hence I) J 10, J 11 (edge only) and L 12, and in Level I, H 10, J 10, J 9 (edge only), K 11, and L 11. These were placed in such thin graves (only just large enough for the body) and the material from them was discarded (or, in the case of the flints, registered as 1000, i.e. of uncertain level), so that they really need not trouble us.

Area 1100 on the general plan (Pl. LXXV) was also excavated, but it was so disturbed that it was not possible to work it out in archæological levels. It covers an area of some 240 sq. m. and the material from it has been registered collectively under the general "*Fundplatz*" number of 1100.

Another registration is that of the word "Cultivation." This indicates material which was picked up largely by the brickmakers, but which is known to have certainly come from the settlement. Most likely this material came either from the surface or from the deposits of the area between Areas 1000 and 1100 on the general plan (Pl. LXXV).

And finally the material which has been collected from the surface of Area 1000 or which has come from an uncertain level in that Area has been registered collectively as 1000 (without reference to Level). All these field registrations have been maintained in the present chapter.

It has already been stated that in the levelled area the deposit reaches 45–50 cm. Evidence has been given in a preceding chapter that in spite of this relative thinness of the deposit we are dealing here with a proper "settlement." We shall attempt to show by the study of the flints that this conclusion is fully confirmed. The three Levels III, II and I show an unmistakable gradation in the flint classes, types and sub-types from the bottom one upwards. They also include certain unfinished tools as well as some broken and re-worked implements which all go to argue that the industry was at least partly worked locally.[1] Also the concentration of the flints in certain squares (see plans of distribution on Pl. LXIX; also charts in present volume) may be taken to indicate that the material when excavated must have been in the same position as left by the original inhabitants. At any rate, it will be seen that there can be no question of the material having been just "washed" there from some higher site on the desert spurs. The physical condition of the flint tools themselves makes such a hypothetical possibility untenable. Apart from battering by use, these tools are practically fresh and show no sign of water or even wind erosion. This latter point is particularly important as it renders it also difficult to assume that the accumulation of deposits was originally much thicker than it is now and that it was reduced by the blowing away of the midden dust by wind activity.

The material used in the industry is almost entirely flint or chert of fairly good quality. It includes both nodular and tabular forms and is mostly of very light brown, light brown or

[1] Though the number of these tools and implements is not high enough to suggest that we are dealing with a flaking site. In fact, waste chips are almost entirely absent.

smoky greyish-brown colour. Judging by the condition and colour of the cortex, which is still partly left on many of the tools, the material was not just picked up from the desert surface, but must have been dug out or mined from certain outcrops in the Cretaceous and Eocene escarpments, or at least picked up as nodular pebbles from some terrace or talus formations. The pieces which have orange and patinated cortex are exceedingly rare. The specimens made on material other than flint include a porphyrite polished axe (*vide infra*) and a number of hammer-stones and grinders of granite, quartzite, quartz-porphyry, hard-cemented sandstone or conglomerate, mudstone and siliceous limestone. All these (except perhaps the first one) could have been obtained locally as pebbles.

Section IV: Morphology, Technique and Typological Connections of the Industry: A General Classification

As it has already been stated the study of the flint industry of Egypt in Neolithic and later times remains in its very beginning. Apart from very recent works little is known about the details of the technique of the various settlement industries. The lack of any such comprehensive work of reference as a corpus of the various classes and types of tools makes it necessary to give here many of the technological details which might have otherwise been omitted. In order to make the argument less confusing, however, it has been decided to reserve the greater part of these details to the last section (vi) of the present chapter, where a full description of the specimens illustrated is given. These specimens include a fully representative selection from amongst the industry, and the list of illustrations may be taken to represent a fairly complete and empirical account of their technique, typology and method of utilisation. In the present section, on the other hand, the classification is given only in general outline; and the main object is to discern, in general terms, the value of technological and typological data for establishing cultural and, in certain cases, chronological connections between Armant and other Egyptian settlements.

In dividing the collection at our disposal into classes and types various points had to be taken into account. It was not easy at the beginning to decide whether we should adopt a purely technological basis for the division of the classes or whether it would be more helpful to classify them according to their chronological occurrence in the settlement. It soon became evident, however, that in the present state of our knowledge the second system—on its face value the more ideal one—can only be misleading. For it to be of any practical value in correlation, we have to presuppose that there has been the same chronological sequence of the various flint classes in the various parts of the country—a supposition which, at the best, can only be regarded as hypothetical. A less ambitious, technological, basis for classification may therefore be more practicable at the present juncture, though it has the obvious disadvantage of depending too much on the technique and typology for correlation purposes. A certain amount of restraint is therefore necessary if we are to avoid an undue interpretation of cultural data as indicating chronological connections between the various settlements. At the same time, however, it may be safe to argue that if we lay more stress on the "technique" as such, and not simply on the "typology," a comparative study of "groups of implements" (and not only individual classes or types) may not be an entirely unreliable method for approximate dating.[1]

[1] Also in some cases, certain highly specialised classes of tools may offer useful clues in chronology.

The classes from the Armant settlement have been divided into twenty-four, of which nineteen are of flint and five of other stone. Some of the classes have not been divided any further, while others have been split into types and sub-types. The classes are numbered in large print, the types are given small letters and the sub-types small numbers after the letters. Some of the tools were either indefinite or multiple in character and could have been put in more than one class or type. In these particular cases both alternatives have been given (in the list of illustrations below, and on the plates), though in working out the proportions the first and most probable one has been adopted. As to the order in which these classes have been arranged, this has inevitably had to be somewhat arbitrary, though an effort has been made to group together the classes which are nearest (technologically and typologically) to each other. We may now pass on to the actual description of these classes, bearing in mind four main points to be brought out in the discussion of each class; namely its technological and typological affinities, its possible utilisation and significance as indicative of the culture and the "*genre de vie*" of the people of the settlement, its zonal and level distribution within the settlement and finally its value for cultural and chronological correlations.

1. *Cores and Tool-Cores* (Plates LVII, 1–2, and LXI, 1–8).

This is a somewhat irregular class in so far as it cannot be classified into definite types. Taken as a whole, the cores are usually of a diminutive character and recall the well-known types of late Upper and Final Palæolithic times. Of these latter Nos. 4–5 on Pl. LXI are of the high, thick type, while No. 7 on the same plate is of the flat, discoidal type which is flaked on one face but from opposing directions. Pl. LXI, No. 2, is interesting because it shows a succession of two or three stages of flaking (see its description in list of illustrations, section vi). The cores also differ in shape and form; some being fairly regular (Pl. LVII, 1 and Pl. LXI, 1 and 3–5), while others are crude and irregular (Pl. LXI, 6). The latter specimen has one flat striking platform, but flakes were struck off it from various directions and not always from the striking platform. Specimen 8 on Pl. LXI is a very crude one, and it is actually made on a broken fragment of what seems to have originally been an axe. This is interesting because it shows that broken fragments were re-utilised—an indirect indication that the industry was at least partly worked locally.

The exact nature and possible utilisation of these cores are not easy to discern. It is true that some of them are fairly large (Pl. LVII, 1, and LXI, 1), but even these bear only small blade-negatives and cannot be regarded as the parent-cores of the fine blade tools of the same assemblage (*vide infra*). Yet according to the report of the excavators no small blades or flakes which could have been struck off these cores have been found in the settlement whose material has been carefully sieved for beads and other minute remains. Of course it may be argued that such microlithic and small blades may have been used for some purpose outside the settlement and that they should not therefore be expected amongst the remains of the habitations. Such an explanation, however, applies equally to all other classes of tools (such as those used in the hunt), and it therefore cannot be reasonably accepted. It would be odd that none of the supposed microlithic tools derived from the flakes should turn up from the settlement. On the other hand, it would be quite legitimate to assume that at least part of the cores under discussion may have been used as tools in themselves. Specimen 5 on Pl. LXI appears to have been utilised as a core-scraper. The majority of the cores which have a less fine character may have been put

to some use of which we do not know as yet. This possibility is strengthened by the fact that at other settlements, such as Ma'adi, similar cores of crude workmanship and without the associated micro-flakes have been found.[1] It may be reasonable to suggest, tentatively, that after being prepared at some flaking site outside the settlement, these cores found their way to the settlement to be used as throwing-stones (or sling-stones), probably in hunting birds in the marshes of the river.[2]

The distribution of the cores and tool-cores within the settlement is not without interest (for the distribution of the various classes see Distribution Table at end of present section and also charts of general distribution in present volume).[3] They are particularly abundant in Level I of Area 1000 which yielded as many as 43 specimens, i.e. more than the rest of the levels and sites put together.[4] They also do not seem to have invariably been associated with, or found in the same proportions to, other artifacts discovered in the various squares in the levelled area (see charts). For example, Square IJ14 has yielded 5 cores out of 15 artifacts and Square IJ12 4 cores out of 9 artifacts, while IK10 and IK11 yielded no cores amongst 9 and 8 tools respectively. Square IIK8 (see chart of Level II), on the other hand, yielded 3 artefacts, all of which are cores. The technological association of the cores with the rest of the artefacts remains therefore an open matter.

As to the value of these cores and tool-cores in indicating cultural and chronological connections nothing can be said with certainty at the present. All that can be safely said is that they differ from the fine cores found in Badarian and later sites and graves and which bear fine negatives of long blades (struck off them). Small numbers of cores similar to those of Armant have been found in practically every settlement (regardless of age) but they were not found in any appreciable numbers except at Ma'adi. Owing to obvious reasons, amongst which may be mentioned the very nature of cores and tool-cores, the apparent similarities between the two groups of Armant and Ma'adi, even if fully established, would be of very little value from a chronological (or even cultural) point of view.

2. *Discs and Discoidal-Forms* (Pl. LVII, 6–8).

This class is closely associated to the previous one. The artifacts resemble cores though on the whole they are of rounded shape. Some of them, however, are flat (Pl. LVII, 6), while others are exceptionally thick (Pl. LVII, 8). They are usually worked on most of the two faces with the flaking leading from the edges inwards. Usually, too, the flaking on one face alternates with that on the other, with the result that the edge of the tool has a zigzag outline. The possible use of these discs, like that of similar tools in other industries, remains largely a mystery. In

[1] See O. Menghin and M. Amer (1932), Pl. LXXI. These, however, may be better regarded as sling-stones, *vide infra*).

[2] Cores which may have been utilised as tools of some kind or other may be termed as tool-cores, which should not be confused with the term core-tools which signifies tools made of cores and not of flakes.

[3] There are three such charts in the present volume, each representing one of the Levels of Area 1000. On these the numbers and letters of the classes, types and sub-types of the flints are given in the bottom left-hand corner of each square. These are followed, between brackets, by the number of the specimens discovered. The signs △ and ϕ indicate that there is a drawing or a photographic illustration (respectively). If they are both given without the word " and " between them, it means that one specimen has been both drawn and photographed. (See pp. 258A–C).

[4] It should be noted, however, that the fact that none are included in the group registered as " Cultivation " may be entirely due to the fact that brick-makers and other workmen who collected these specimens did not pay attention to such crude artefacts.

view of the zigzag cutting-edge, they may have been used as throwing-stones. They cannot be regarded as mere cores, as in some cases (Pl. LVII, 8) the flakes struck off them were not usable.

From a distributional point of view it may be noted from the Table below (end of present section) that they all come from Levels II and I and 1000 (presumably surface). There is never more than one of them in a square, except for IJ14 where three pieces were found together with five cores and seven other implements. It may be stated generally that they were chiefly characteristic of the upper part of the settlement. As to their value for establishing any possible connections with other settlements, they can hardly offer any help, not only because they are tools with wide distribution and loose chronological occurrence, but because they do not seem to have always been carefully recorded and described from other settlements in Egypt.

3. *Sling-Stones* (?) (Pl. LVII, 3–4, and Pl. LXI, 9–10).

This is an exceedingly difficult class to define. The tools are usually made of flat or globular nodules and are worked on one end only. The other end is left with the natural, and relatively smooth, cortex. The flakes struck off the worked edge are small and irregular, and they cannot conceivably have been put to any use. It is evident that it was the core tool and not the flake that was aimed at. The flaking blows on one face of the tool alternate with those on the other, and the result is that the worked edge has a zigzag outline (see middle view of 9 and 10 on Pl. LXI ; also cutting edge shown in photograph Pl. LVII, 4). In this respect these tools have a Palæolithic-like appearance and resemble (though only superficially) certain cores of the so-called Clactonian of the L. Palæolithic.[1] The suggestion that these artifacts were used as sling-stones remains a purely hypothetical one, but it is difficult to conceive of any other use to which they could have been put effectively. Some of the flat types (like Pl. LVII, 3) may have been used as choppers, though they hardly show any definite traces of utilisation as such. This latter suggestion, moreover, cannot be applied to the spheroid types. Until, therefore, more is known about the technique and possible use of this class of tools, we may take the present explanation (sling-stones) as the most plausible one.[2]

As may be seen from the Distribution Table at the end of the present section, the definitely recognisable specimens of this class are few (8 in all) and they occur only in Level I (with one piece only from Area 1100). It is evident that in spite of their Palæolithic-like affinities, they do not appear until the top level of the settlement. As to their value for correlation purposes, little can be said in this respect. In the settlement of Merimde certain tools were found which O. Menghin considered to be sling-stones.[3] These finds occur with other Palæolithic-like

[1] On these latter see H. Breuil, " Le Clactonien," *La Prehistoire* t. I, fasc. ii, Paris, 1932, Fig. 1, Nos. 1 and 4, and Fig. 4, Nos. 23–26, also pp. 135, 141 and 145. Similar tools occur in a L. Palæolithic horizon in the Abbasyyah Plain, N. of Cairo (Collection of the Geog. Dept., Egyptian Univ., Cairo). The resemblance between the two sets of tools, however, does not necessarily mean that there is any cultural or chronological connection between them. The tools found at Armant come from Level I and not from the surface and cannot be regarded as Palæolithic specimens which have been " rolled " or washed down from the desert surface.

[2] It should be noted that W. M. Flinders Petrie (1917, p. 36) argues, from the absence of any historic remains, records or illustrations that the sling was not known in Egypt until about 800 B.C. (though it was used in Syria before that). This is interesting as negative evidence, and may be of some value for the historic phase, but it can hardly be of much value in dealing with prehistoric times. The strings or straps of a sling may have been made of reed or leather and may have decayed in the settlement midden. The same argument applies to nearly all the prehistoric hafting fittings (in connection with the various tools which we know to have been hafted) and which have been recovered only in very rare cases.

[3] See H. Junker (1930), p. 30.

tools which still await full and detailed publication. Judging by some available illustrations of tools (not included in the sling-stone group, however) there is close resemblance between some of the Merimdian Palæolithic-like artifacts and the sling-stones of Armant.[1] The nearest approximation to these latter, however, is to be found in some of the core-and pebble-tools at Ma'adi.[2] As in the present state of our knowledge, however, these resemblances between Lower Egypt and Armant cannot be corroborated by any finds from the intervening region, the question of any chronological connections must remain in suspense.

4. *Atypical Tools* (Pl. LVII, 5 and 9–11, and Pl. LXI, 11–13).

This cannot be called a uniform class. It is made up of a heterogeneous group of tools which are either very crude, unfinished, broken and retouched or of an unusual form and technique that they cannot be placed within any of the known classes of implements. Their grouping under the denomination of " atypical " is therefore, in a way, an arbitrary one. Specimen 5 on Pl. LVII has one finely finished end (bottom of photograph) and may have served as a small axe. Nos. 9–11 on the same plate may represent crude and unfinished choppers. Specimen 11 on Pl. LXI is a curious tool which may have either been used as an axe or perhaps as a multiple hollow scraper (very slightly hollow edges). No. 12 on the same plate is a flake whose tip has been " mutilated " by steep trimming from one face or the other. Its lateral edges are also steeply trimmed. No. 13 (Pl. LXI) may be taken as a triangular tranchet. Its cutting end has been re-edged or bevelled by means of a transversal blow (compare outline section in the middle). The traces of this re-edging have been largely obliterated by subsequent use and battering of the cutting edge (shown in drawing).

The existence of these tools in the settlement has a special significance. It is hard to conceive of such tools being traded from one settlement to the other. They can only have been made locally or at some local chipping site from which they were brought to the settlement either to be used as they are or to be finished subsequently. Their occurrence therefore is important because it adds further weight (if this be needed) to the argument that we are dealing here with a " local " industry. As to their distribution within the settlement, this presents no special feature except that they are relatively less predominant in Level II than in Levels III or I.

As may be expected, such a mixed group of atypical tools can hardly be of any practical value in establishing cultural or chronological connections.

5. *Polished Axe or Celt* (Pl. LVII, 26, or Pl. LXIII, 31).

This class is represented by a single (broken) specimen. It is made of Albite-Porphyrite (or possibly Ceratophyre) and is ground and polished (though not very well). It was not possible

[1] See O. Menghin (1932b), Abb. 11. We may also note that a fairly large collection made by Prof. O. Menghin on the surface of the desert near Merimde, contains numerous specimens which resemble our sling stones, not only in appearance, but also in technique (alternating chipping producing zig-zag outline on cutting edge). (Coll. temporarily kept in Naturhistorisches Mus., Wien). As the collection, however, is a surface one, nothing can be said about its chronological place. It can be regarded as either of L. and early Mid. Palæolithic date (and thus be associated with the Clactonian cores or pebble tools of the deposits of the Abbasyyah Plain ; *vide supra*) or as Palæolithic-like implements of some late prehistoric date. Further light will be thrown on this point when the collection is published with relative data by Prof. O. Menghin, to whom the writer is indebted for access to the material, and for helpful information and discussions regarding it.

[2] For these see O. Menghin and M. Amer (1932), p. 45 and Pl. LXXI, Nos. 4–11.

to determine whether it was originally made from a pebble or a piece of quarried stone, though the latter alternative is more likely. The specimen has a somewhat irregular ovoid cross-section (top right hand of drawing, Pl. LXIII, 31), and its cutting edge, which is not quite straight, lies only approximately along the symmetrical axis of the tool (bottom left-hand outline of same drawing). The cutting edge shows traces of battering and use.

This unique tool comes from the lowermost Level (III O 12). It contrasts with the " flaked axes," which, together with the " flaked adzes " number as many as 103 specimens. Polished axes are very rare in Upper Egypt and may not be without use for purposes of correlation and dating.[1] They seem to occur only in the Early Predynastic (i.e. Amratian) phase,[2] though a number of specimens has also come from the Tasian (*vide supra*). In L. Egypt and the Fayyoum, on the other hand, they are characteristic of the true Neolithic, while in Nubia they occur in abundance during what seems to be a chronologically later phase (perhaps Late Predynastic and later). As a large number of these tools are made of igneous rocks, an interesting line of study would be to determine and compare their micro-sections. Such a study along petrographic lines might help to trace the origin of the rock, and thus throw useful light on the question of the trading of these special and rare tools (apart from those amongst which that may be made on pebbles). Unfortunately such a study is still a desideratum, as it needs not only a careful determination of the micro-sections of the tools but also of similar sections from all the available sources of igneous rocks in the country. This is by no means an easy task. The following are the details of the micro-section of part of the present specimen (after it had been drawn and photographed) as kindly determined by Dr. S. R. Nockolds of the Geological Department of the University of Manchester. It was not possible to correlate this section with any of those published in F. W. Hume's *Geology of Egypt* (Vol. II, Part I, Cairo, 1934), but it may be helpful for any future study of the kind suggested above, to give these details :

" Albite-Porphyrite or possibly a Ceratophyre. Phenocrysts of Albite in an extremely fine grained matrix of plagioclase (probably albite) microlites and quartz together with granules of iron ore and minute flakes and patches of dark mica which is highly pleochroic from brown to opaque. Parts of the ground-mass show a rough spherulitic intergrowth of the quartz and felspar. Some apatite enclosed in the plagioclase phenocrysts. A little secondary epidote and calcite."

Mr. O. H. Little, Director of the Geological Survey of Egypt, has sent us the following additional report :

" *Ar. III O* 12. (Hand specimen and microscope slide.)

" Two of the rocks in our collection resemble the above in the hand specimen, but I have had slices cut from these and examination under the microscope showed that in neither case are they identical with your specimen.

" The most nearly related specimen, from a vein in Wadi Gidami, N.E. of Qena, is a little darker in colour and under the microscope is seen to consist of porphyritic crystals of quartz

[1] For mention of the numbers of specimens found in L. and Up. Egypt and Nubia up to 1930 see H. Junker (1930), pp. 62–4.

[2] See reference in G. Caton-Thompson (1928), p. 82.

and felspar (oligoclase to andesine) in a very fine ground-mass of felspar laths, quartz and iron oxide (magnetite). The ground-mass contains more iron than that of the implement.

" The second specimen from a dyke one and a half kilometres east of Bir Sibrit (Lat. 24° 43′ N, Long. 33° 59′ E), contains porphyritic crystals of soda-felspar and aegerine-augite set in a felsitic ground-mass consisting mostly of a less sodic felspar and magnetite."

6. *Flaked Axes* (Pl. LXVII, 12–25, Pl. LXII, 14–22, and Pl. LXIII, 23–24).

This is one of the most important classes of the series and may even be taken as the " type-tool " of the settlement. The axes are sometimes made from nodules of convenient shape (e.g. Pl. LVII, 13–14, and Pl. LXII, 21), or from relatively thin sheets of tabular flint (e.g. Pl. LVII, 15). In the great majority of cases, however, they are given the required shape by means of flaking on both faces. The shape of the tools varies from round (or almost so) (Pl. LVII, 23) to rectangular with almost perfectly straight lateral edges (Pl. LVII, 21, or Pl. LXII, 16). Some of them have relatively broad cutting edges (Pl. LVII, 12–13, and 15, and Pl. LXII, 17), while others have narrow ones (Pl. LVII, 22 and 25). A few of these latter appear to have had their cutting edges deliberately narrowed by means of lateral re-touching, apparently in order to render them more suitable for penetrating and cleaving (Pl. LVII, 16, or Pl. LXII, 14) The tools vary in size, as some are small and thick (Pl. LXII, 18), while others are large and relatively thin (Pl. LVII, 21, or LXII, 16, and LXII, 17). The cutting edges seem to have generally been on one end only, though there are one or two specimens (e.g. Pl. LXIII, 23, and perhaps also LVII, 17) which exhibit traces of having had two cutting edges. It is improbable, however, that these latter represented true " double-axes," because there are indications that one of the edges was used and battered before the other end was re-edged and put to use in its place. In a certain number of tools the cutting edge is relatively straight (Pl. LVII, 20, and LXII, 17), though more often it is of the curved type (Pl. LXII, 16). The end opposite to the cutting one also shows varying forms and shapes. Sometimes it is made of the natural, cortex-covered surface of the original nodule (Pl. LVII, 13, and Pl. LXII, 21) ; but more often it shows what appears to be preparations for hafting. In a fairly large number of specimens this edge is thinned by means of flaking which usually runs in a longitudinal direction, i.e. along the main axis of the tool (e.g. Pl. LVII, 22, and Pl. LXII, 14, 17 and 19 ; also Pl. LXIII, 24). This flaking is also sometimes of an irregular or oblique character (Pl. LXII, 18, 22). In a small number of cases, there is even a neck or semi-neck produced by one or two (opposite) lateral notches (Pl. LVII, 19 and 24, and Pl. LXII, 19). That the greater part of these tools was hafted appears therefore to be abundantly clear.

The possible use or uses of these artifacts are, on the other hand, not so easy to determine. Some of the specimens with narrow working edges can have served only as axes, but others with broad edges would have been equally serviceable as hoes. The fact that, as we shall presently see, the greater part of the specimens have their working edge so neatly prepared and re-edged, may perhaps argue for their use as sharp cutting tools ; but such an elaborate preparation may have also been necessitated by use in heavy (and sticky) soil in which only sharp and neatly finished tools could be easily driven and extricated. An interesting line of investigation which might have shed useful light on the subject would have been the experimentation on the use of such tools in hoeing alluvium on the edges of the Nile Valley. No such experiments have been carried out as yet, but it is reasonable to expect that the silica in this alluvium would

not fail to leave an effect (in the form of gloss) on the edges of the hoeing tools, provided that these latter were used for a sufficient length of time. In this respect, it is interesting to note that not more than one or two of the eighty-five specimens from the settlement exhibit any traces of such gloss. In one case (Pl. LVII, 23 ; see also description of specimen in list of illustrations, Section VI) the gloss appears to have covered the *whole* of the specimen and to have been partly removed by newer re-flaking. This is interesting as it renders it difficult to assume that it was produced by its use as a hoe. On the one hand, a hoe would never get friction-gloss all over it by use in the ground (as it must have been either hafted or at least held in the hand by the thick end), while on the other, the new re-flaking, which gives the tool its present form, shows no traces of such gloss. The most plausible explanation, therefore, is that after its first manufacture, this particular specimen fell into disuse and was left in some silica-bearing, running or percolating water before it was picked up and re-flaked anew. In short a careful examination of the specimens as a whole leads to the conclusion that although in the present state of our knowledge their use as hoes cannot be entirely disproved, it is more satisfactory, at least for the moment, to regard them primarily as axes.[1] At the same time, the possible use of the present class of artifacts as " weapons " (for hunting and fighting) and not just as " tools " should not be entirely left out of sight.[2]

It has already been mentioned that the greater part of these tools have their working ends " re-edged." This is effected by means of a transversal blow which removes a flake off the working end and furnishes it with a new, straight and sharp edge (this is particularly clear on the drawings on Pl. LXII). In nearly all cases the " blow " (which removes the transversal flake) is given from one side, but in a very few specimens (e.g. Pl. LXII, 21) two knocks are given from opposite directions. The process of re-edging will be further discussed when we deal with Class 8 (*vide infra*) ; but it may be mentioned here that, apart from giving the tool a sharp and straight edge (instead of the zigzag one produced by ordinary small flaking on both faces), it seems to have had another advantage. It should be noted that although in some cases this re-edging brings the cutting edge of the tool to fall in line with the symmetrical axis of the tool (Pl. LXII, 21, middle view, and also Fig. E of Diagram 1 on Pl. LXIII, where the outline of the tool is schematically represented by a solid line and the symmetrical axis by a dotted one), it more often removes this edge to one side of the axis (Pl. LXII, 16, 17 and 19, middle views ; and also Fig. F on Diagram 1 on Pl. LXIII). This, while rendering the tool serviceable both as an axe and as an adze (*vide infra* Class 7), appears also to increase the resistance of the edge and lengthen its service-life. As may be seen from Figs. D and E (on same diagram) an axe which has its cutting edge along the symmetrical axis (whether it was re-edged or not) has only one stage of wear (shown in broken line). On the other hand, an axe which has the edge to one side of its axis (Fig. F on same diagram) has two such stages (also shown in broken lines). The first stage brings the edge to the symmetrical axis (which corresponds to the original state in Figs. D and E), while the second one blunts it. However, this is perhaps largely a theoretical explanation which still needs full confirmation by experiment ; but it is given here for what it may be worth.

[1] It may be mentioned in passing that although certain rushes contain silica, ordinary wood does not contain any and would not react on axes used in cutting and working it.

[2] It should be remembered that Armant and other cognate settlements such as Toukh and Nag' Hammadi, where these axes abound, have yielded no " mace-heads." The axes may have perhaps served a similar purpose (to the mace-heads).

According to the type of the re-edging of the working end, these axes may be broadly divided as follows :

(a) Without any transversal re-edging (Pl. LVII, 12–16, and Pl. LXII, 14).
(b) With transversal re-edging of one end on one face only (Pl. LVII, 17–24 and Pl. LXII, 15–21).
(c) With transversal re-edging of one end on the two faces (Pl. LVII, 25, Pl. LXII, 22 and Pl. LXIII, 24).
(d) With transversal re-edging of the two ends on one face (somewhat doubtful type) (Pl. LXIII, 23).

The distribution of each of these four types and of the whole class within the settlement (compare Distribution Table at end of present Section ; also Chart sheets in present volume) is not without interest. The type " b " is by far the most abundant of all and it is the only one that occurs right through the three Levels. There are, however, only three specimens from Level III, while Level I has yielded no less than twenty-two. Type " a," the next most abundant, occurs only in Levels II and I and it is probable that most of the thirteen specimens registered as 1000 may have come from the surface. Type " c " is known from Level I only and from the surface. And finally type " d " is of a doubtful nature, and the only certain specimen comes from Level I. This distribution is interesting because it shows that type " a," which is the crudest, was not necessarily the earliest. Indeed all indications go to show that it was type " b " which represented the typical axe " *par excellence* " from the lowermost level onwards. Also from a general point of view, the distribution of the axes conforms to that of some of the other main classes in that, although they are fairly well distributed over the settlement, they seem to be concentrated in certain Squares. For example, I J 10, I J 12, and I K 10 have yielded four specimens each, while I J 14, which yielded the largest number of tools from a single square (15), contained no axes at all (and only one adze).

But the chief interest of this class lies in the cultural, and perhaps also chronological, connections that they establish for the Armant settlement. Similar specimens have already been recorded from the middens of Toukh, Zawaidah and Khattarah as early as the end of last century.[1] Specimens of this class have also been collected and carefully studied by Ed. Vignard from the station of Nag' Hammadi.[2] None of these sites, however, is dated, and indeed their chronological place can be fixed only through the help of some better-excavated cognate settlements with similar material (such as Armant). Flaked axes are also known from Mahasnah (probably Amratian and early Middle Predynastic), though no specimens with clear re-edging could be distinguished amongst the published photographs.[3] Farther North, the Predynastic remains (largely graves) seem to be very poor in axes of any kind, especially the Middle and Late Predynastic phases. To the South of Armant one solitary example of what appears (judging by photograph) to be a re-edged axe has been found in a grave at Hierakonpolis, though owing

[1] See J. de Morgan (1896), pp. 92–6 and Figs. 59–71, and (1897), Fig. 165. Also three doubtful specimens, apparently from Toukh, in W. M. Flinders Petrie and J. E. Quibell (1896), Pl. LXXI, 31, 40 and 43. See also W. M. Flinders Petrie (1915), Figs. 53 and 55.

[2] See Ed. Vignard (1921), pp. 10–11 and Pl. XIV, 3–4, and Pl. XV, 2 ; and (1929), p. 300 (where mention is made that he collected 300 pieces) and Pl. V, 2.

[3] See J. Garstang (1903), Pl. V.

to discrepancy between the text and illustration in the publication, nothing can be said with certainty about the exact conditions in which the specimen was found or about its chronological place.[1] To the West of Armant, on the other hand, a large number of specimens (identical with those of our settlement) has recently been discovered in the region of the Khargah Oasis.[2] To the East of the Nile, this class has thus far turned up only amongst some remains from Mustagiddah (*vide supra*). These specimens (now in the British Museum) are thought by the discoverer (G. Brunton) to be probably Tasian, but their associations do not limit their origin to this period. It is not entirely improbable that they may represent an infusion into an industry with some surviving Tasian tradition. Further light will be thrown on this point in the forthcoming publication by G. Brunton (*vide supra*, Section ii).

Speaking in general terms, it may be therefore stated that we have in the Armant, Toukh and Nag' Hammadi region a kernel zone for a group of industries which are largely characterised by the abundant occurrence of flaked (and re-edged) axes. The technique also extends westwards to the Khargah region, and may have some extensions at least as far northwards as Mahasnah and southwards as Hierakonpolis. Whether it extended beyond this area remains to be seen. To the East of the Nile it has thus far been recorded only from Mustagiddah. The possibility of some measure of distinction between the flint industry of this area and that of the Predynastic cultures in more northerly parts of Upper and Middle Egypt (including the settlement of Hemmamiah, which lies East of Nile and which yielded no well-ascertained specimens of flaked or re-edged axes) will be further alluded to in the following Section.

7. *Flaked Adzes* (Pl. LVII, 27–34, and Pl. LXIII, 25–27).

This is a small class and could have perhaps been added to the previous one were it not for certain differences in preparation and utilisation. It is generally admitted that the difference between an axe and an adze is that whereas the first is hafted along the main axis of the handle and is used for longitudinal splitting, the second is fixed at right angles to the handle and used for transversal chopping. For these two methods of use the position of the cutting edge in relation to the symmetrical axis of the tool is thought to be of importance. Admittedly a tool with an outline like Fig. C in Diagram 1 (Pl. LXIII) (i.e. with its cutting edge on one side of the axis) is much more suitable as an adze than as an axe, while the case is the opposite with Fig. D. But other things must be taken into consideration, and among these are the general shape of the tool, its thickness and, still more important, the straightness of its working edge. Some of the tools from Armant have their cutting edge on one side of the axis (like Fig. F of the same diagram), but owing to their general form and to the fact that the cutting edge is curved they would pass better as axes than as adzes (Pl. LXII, 16 and 19). Also some of the tools have their cutting edge along the symmetrical axis (like Figs. A and B), but owing to their thinness, their general shape and the straightness of their cutting edges, they may have served in the first place as adzes (Pl. LVII, 29, and Pl. LXIII, 27). It may be stated therefore that although, on the whole, specimens with outline and edges similar to Figs. A, B and C can better be regarded as adzes, while ones similar to Figs. D, E and F may pass better as axes, various other considerations must be taken into account.

[1] J. E. Quibell (1900), p. 48 and Pl. LX.

[2] Information regarding these and other finds bearing connections with Armant, has been kindly given by Miss G. Caton-Thompson. (See also her forthcoming publication on Khargah).

This class can be divided into three types : a, b and c, on exactly the same lines as the flaked axes. The relative smallness of the series, however, makes it difficult to argue much from their distribution. This, together with their significance for cultural connections, may be taken to be on the whole similar to that of the former class.

8. *Re-edging Flakes* (Pl. LVII, 35–37, and Pl. LXIII, 28–30).

It has already been stated that the majority of the axes and adzes have had their working ends sharpened or re-edged by means of transversal blows which knock off transversal or " re-edging " flakes. The possible advantages of this process have also been hinted at (*vide supra* Class 6 ; also for more details see description of re-edging flakes in list of illustration, Section VI). The occurrence of such discarded flakes has been noted in Egypt (Toukh) as early as 1897.[1] Ed. Vignard, who made a special study of surface material from the station of Nag' Hammadi, calls this process as " *avivage* " and the rejected flakes as " *éclat d'avivage*."[2] He calls it such because he argues that the edges of a small number of the rejected flakes show battering and use and that consequently they must have belonged to a battered edge of an axe which was " renewed " by striking off a flake.[3] It should be pointed out, however, that none of the specimens from our settlement (nine or ten in all) shows any such traces of battering. All that they show is a zigzag or at least un-straight edge produced by the small flaking on both faces of the original edge of the axe before the flake was struck off (compare illustrations Pl. LXIII, 28–30). It seems preferable, therefore, until definite evidence is at hand, to consider the process as part of the original finishing of the tool and not as an " *avivage*." For this reason it has been called here as " re-edging," i.e. giving the axe a straight and sharp edge instead of its unfinished and zigzag one.

Another interesting remark which is also brought out by the Armant material is that all the specimens recovered from the settlement are fine and fairly long flakes which do not correspond to any of the negatives on the edges of the axes. Only one small, crude and largely doubtful specimen has come from 1000 (probably surface) and it was felt more satisfactory to regard it as an atypical chip than as a true re-edging flake. The specimens found at Armant can therefore hardly have belonged to the same axes as those recovered from the settlement. Furthermore, the discrepancy between the number of these flakes (nine or ten) and that of the re-edged axes and adzes (seventy-three) may be sufficient to argue strongly for the possibility of the tools having been re-edged at some flaking site outside the settlement. If this be so, it may also lend further support to the suggestion that the re-edging or transversal bevelling was part of the finishing process at the flaking site and not a true " *avivage* " to be done at the settlement after the specimen had been used and battered. At the same time, the existence of only fine specimens of re-edging flakes at the settlement may have another explanation. They may have been brought back from the flaking site as serviceable tools. In this respect, Armant has also yielded two interesting specimens (one of which is illustrated on Pl. LIX, 90 ; see also its description in the list of illustrations, Section VI) of crude blade-sickles which appear to have almost certainly been made from re-edging flakes.

[1] See J. de Morgan (1897), pp. 115–116, where he corrected a view he expressed a year earlier (1896), p. 118, that they were just " *conteaux courbés*."

[2] Ed. Vignard (1921), pp. 10–11, Pl. XIV, 1–2 and Pl. XV, 3 ; and (1929), Pl. V, 3.

[3] He illustrated only one such specimen of a flake (1929, Pl. V, 3) on which, judging by a comparison of the two side-views illustrated, the battering does not seem to be very convincing.

The distribution of these flakes within the settlement cannot be of much help owing to the smallness of the series. It may be mentioned in passing, however, that, as may be seen from the chart sheet of Level I (in present volume) these artifacts do not seem to have always been found in association with re-edged axes. As to their value for establishing cultural connections, nothing can be said at present as they have thus far been identified only at Toukh and Nag' Hammadi.

9. *Dibbles or Digging-picks* (?) (Pl. LVIII, 38–43, and Pl. LXIV, 32–37).

This makes another of the mysterious classes of the flint tools of Armant. The artifacts are made of large nodules, usually with massive butts. The butt is left with the original cortex on, though in a number of specimens (e.g. Pl. LVIII, 39) it has been trimmed, presumably as a preparation for hafting. The tool has a finely prepared and relatively delicate neck (or narrow and relatively long working end) prepared on both faces by means of both primary and secondary trimming. The cross section of the neck is either double ovoid (Pl. LXIV, 32), plano-convex (Pl. LXIV, 34) or as in one solitary specimen (Pl. LXIV, 37) somewhat trihedral. The very tip of the neck is either left intact or sharpened by means of one or more "*coups de burin*." According to the condition of the tip this class may be divided into the following types :

(a) With no "*coup de burin*" on tip (Pl. LVIII, 38, and Pl. LXIV, 32).
(b) With single re-edging or sharpening by means of a longitudinal "*coup de burin*" applied on one face of the tip (Pl. LVIII, 39, and 42, and Pl. LXIV, 34 and 37).
(c) With single re-edging or sharpening by means of a transversal "*coup de burin*" applied on one face of the tip (Pl. LXIV, 33).
(d) With double re-edging or sharpening by means of "*coups de burin*"; usually one longitudinal on one face and the other transversal on the other (Pl. LVIII, 40–41 and 43, and Pl. LXIV, 35–36).

The probable use of these tools remains somewhat of a puzzle. The fact that the neck is usually relatively long and delicate in relation to the butt, suggests that the implements could not have been used with violence. If they were digging-picks at all it would be difficult to imagine that they were used in such work as quarrying flint, salt, or even soft gypsum. Furthermore, such operations are usually performed by means of crude picks which have been only summarily shaped.[1] It would be absurd to prepare the tip of such tools in the elaborate way exhibited by the specimens of Armant.[2] In all likelihood therefore the tools must have been used in some kind of work which, while not requiring violence, needed penetrating power. If this be so, it may be suggested that they were used as dibbles for digging holes in the soil and burying the seed.[3] The neatly sharpened tip would facilitate penetration into the heavy

[1] e.g., G. Caton-Thompson and E. W. Gardner (1934), Pl. LXVII (Old Kingdom picks from Umm es-Sawan gypsum quarries).

[2] There can be no reason to assume that the "*coups de burin*" on the tip of the specimens illustrated on Pl. LXIV have been produced accidentally by the use of the implements as picks. The "*coups*" are so methodic and well done that there can be little doubt about their intentional origin. Some of them have been repeated in a process of true *avivage* is evident (Pl. LXIV, 34), while others have been given in a perfectly transversal direction (Pl. LXIV, 33). Such features are not usually the result of accident.

[3] It should be noted, however, that apart from very slight battering on the tips of certain specimens, these dibbles ahow no definite traces of utilization. It is not known whether the fact that they were used only occasionally (in the sppropriate season) and without such violence, or even constant friction, as in the case of the use of hoes, may account for the fact that their necks do not show any gloss such as might have been caused by the silica in the alluvium.

soil while the thin and elongated shape of the neck would render easier the extrication of the tool from the hole in the ground.[1] If the association of these tools with some form of agriculture is accepted, it would throw interesting light on the significance of their distribution within the settlement (compare also Distribution Table). Although three specimens are known from Level III none occur in Level II, except perhaps an atypical piece. On the other hand, Level I yielded eight specimens, while the mixed groups registered as 1000 and "Cultivation" (and which were probably largely surface specimens) amounted to six and eight pieces respectively. It appears therefore that, taken as a whole, this class became more abundant (at least in total numbers and in variety of types, though not in proportion to other classes) in the upper part of the settlement (i.e. Level I to surface as contrasted to Levels III and II together).[2] It would be interesting to keep this in mind when we come to consider other agricultural implements (such as sickles) a little later.

In the present state of our knowledge, the cultural connections which this class may establish between Armant and other parts of Egypt cannot be determined. Identical specimens have been collected from the surface of the settlements at Toukh and Zawaidah, by J. De Morgan, although he regarded them as representatives or at least survivals from the Lower Palæolithic.[3] A similar specimen has also been found by Ed. Vignard at the station of Nag' Hammadi, but he calls it a "*poignard*" and dates it together with the rest of his tools in the Aurignacian.[4] There is also the possibility that other specimens may occur in the Khargah area. Outside the region of Armant and the adjacent areas, similar tools have thus far turned up only from the Neolithic site of Merimde.[5] These specimens, however, are much cruder than the Armant ones and in fact they recall in appearance the pebble "Faustkeile" of the so-called "Chalossian." Menghin considers that they may have been used as large borers or as picks to split large bones (such as those of the hippopotamus which was hunted by the Merimdians). Judging by the published photographs, these specimens resemble more the ordinary type of pick than our specimens which are better finished.[6]

It is clear from this that, so far as the dating of this class is concerned, no help can be satisfactorily sought outside Armant. In fact it seems that the superficial resemblances of the tools with Palæolithic forms may have accounted for their being neglected or mis-dated by various workers on Neolithic and later cultures. Now that they have been found in definite association with other material in the Armant settlement a clearer view of their chronological status may be gained. Indeed a close examination of their technique may be enough to show that their

[1] The tools may have also been used for digging up roots as in some relatively primitive societies of the present day, but we do not know if root plants and crops were of any appreciable importance on the borders of the Nile Valley in those days.

[2] It should be also noted that the specimens from Level III are rather small and not well finished. One of them may even be regarded just as a large borer.

[3] See J. de Morgan (1896), Figs. 6–7 and (1897), Fig. 19. It may be also suspected that Figs. 28–29 in W. M. Flinders Petrie (1915) which he regarded as Acheulean may have been nothing but dibbles of the Armant and Toukh type.

[4] Ed. Vignard (1921), p. 12 and Pl. I, 4.

[5] O. Menghin (1932b), p. 86 and Taf. VIIa.

[6] O. Menghin, however, *ibid.*, p. 86, mentions another type whose specimens may pass in form "als ferfeinerte Faustkeiltypen des Acheuléen." A detailed study of this latter type may perhaps reveal certain more definite affinities with Armant.

typological resemblance to Palæolithic forms is in some respects rather superficial.[1] The very fact that these tools, and more particularly the other Palæolithic-like artefacts (such as the tool-cores, the discs, the sling-stones, etc.), occur chiefly in the upper part of the settlement and are limited in variety (or absent altogether in the case of discs and sling-stones) in the lower one, may also argue that we are dealing here with a new technique of entirely different origin from the Palæolithic proper. This point will be further referred to in Section V.

10. *Chisel and Chisel-ended Tools* (Pl. LVIII, 44, 47–8, Pl. LIX, 85–6, Pl. LXV, 38–9).

This class need only be mentioned in brief. The tools are either entirely or largely bifacial and have a broad or narrow cutting edge. Some of them have definite preparation for hafting. They may be classified into the following types and sub-types :

(a) Chisel proper (Pl. LVIII, 44, or Pl. LXV., 38). This is a unique specimen which is fully described in the list of illustrations (Section VI). It has a definite tang and a cutting edge which is bevelled by ordinary sloping re-touch. Such a specialized type of tool might have been useful for comparison with other industries, but unfortunately it is of a very rare kind. So far as is known the only similar specimens occur either on the surface or in disturbed and uncertain levels in the Fayyoum and Merimde ; and their cultural and chronological horizon cannot, therefore, be fixed with certainty.[2]

(b) Chisel-ended tools. This is rather a doubtful and somewhat atypical type. The tools may have served for other purposes besides being chisel-ended. According largely to their form and shape they may be sub-divided as follows :

(1) An elongated triangular sub-type with one end pointed and the other squared (Pl. LIX, 86).

(2) Ordinary triangular sub-type (Pl. LIX, 85).

(3) Rectangular sub-type which, in a way, resembles the bifacial planes (*vide infra*) (Pl. LVIII, 47–48, and Pl. LXV, 39).

This class is small and somewhat heterogeneous and nothing can be gained by the study of its distribution within the settlement. Apart from what has already been mentioned nothing can be added on its connections with other industries except that the rectangular variety seems to be, at least up to now, without parallel elsewhere.

11. *Planes* (Pl. LVIII, 45–46 and 49–53, and Pl. LXV, 40–46).

This is on the other hand a more typical and specialised class. The tools are usually made from relatively thin sheets of tabular flint or of struck flakes, and are of a triangular or more

[1] The lanceolate types of the Up. Acheulean (of Europe) and Micoquian never have such finely developed and retouched necks and points as our specimens. In this respect it should be pointed out that, in the light of recent evidence from Egypt and Palestine, the lanceolate types of the Acheulean of these regions occur in Middle rather than in Up. Acheulean times (when the cordiform types predominate). Certainly none of the known lanceolate types of the true. Acheulean of Egypt approach in fineness and finish any of the Armant dibbles. Also the fact that certain specimens of the Up. Acheulean of Palestine exhibit "*coups de burin*" on the tip (R. Neuville " L'Acheuléen supérieur de la Grotte d' Oumm—Qatafa [Palestine] " *L'Anthropologie* T. 41, 1931, Fig. 18, No. 6) cannot be taken as pointing to any direct technological connection between this industry and that of Armant, as the palæolithic specimens of Palestine are of the completely bifacial cordiform type which is quite different in technique and form from the Armant implements.

[2] For Fayyoum specimens see J. de Morgan (1897), Figs. 343–4, especially the latter. For Merimde specimens see H. Junker (1929), Abb. 4, h, and Taf. IXb, 1 and 8, also pp. 221, 243, and 247.

or less rectangular shape. Their working edges (making the base of the triangle) are either straight or slightly convex. The under surface is, on the whole, flat except in a single case where the bulb of the struck flake is retained (see description of Specimen 51, on Plate LVIII, in list of illustrations below). The cross section of the tool is usually a flat plano-convex. The work is usually on the upper face only and is steep on all edges, especially the working edge. In a number of tools, however, most (or the whole) of the under surface is also worked by flat pressure flaking. Largely along these lines the class may be divided into two types :

(a) Largely bifacial, and less typical, specimens, with the under surface worked all over (or nearly so) with a view to rendering it flat (Pl. LVIII, 45–46, 49, and Pl. LXV, 40–42).

(b) More typical planes with the under surface either untouched or only very slightly flaked especially near the narrow end (for hafting ?) (Pl. LVIII, 50–53, and Pl. LXV, 43–46). There is usually a more careful selection of the material on which the specimens of this type are made.

As to the probable use of these implements it appears that they must have been used for some specialised form of scraping and planing of rough surfaces. The distribution of the two represented types within the settlement is not without interest. As may be seen from the Distribution Table below, the proportions of the first type to the second in the three levels are as follows : 3:4 in Level III ; 4:7 in Level II, and 2:8 in Level I.[1] There is a gradual passing from the largely bifacial type to the more typical unifacial (or largely unifacial) one. The group registered as 1000, which is largely (though not entirely) made up of surface material, has a proportion of 2:6.

The cultural connections with the material from other settlements are also of some interest. Similar specimens are figured from Toukh (near Naqadah), though they have not been identified as planes.[2] The class is also represented in the Khargah Oasis which has yielded practically all the varieties of Armant (except for the specimen with the bulb still on under surface).[3] One or two specimens are also known to have come from Mustagiddah (east of the Nile) where they have been found with the re-edged axes mentioned above.[4] But by far the most interesting and only datable link is that with the Fayyoum B phase.[5] Planes are known from the Fayyoum, and although their place in the A phase is doubtful there can be little doubt about their occurrence in the B phase. So far as is known the tool has never been traced in the other Predynastic settlements or cemetery areas (except perhaps the Mahasnah settlement ; *vide supra* Section II).

[1] Two or three other bifacial and roughly rectangular artifacts (Pl. LVIII, 47–8 and Pl. LXV, 39) come from Level II but these are of such unusual technique and shape that they could not be regarded as planes *sensu stricto*, and it has thus been found more satisfactory to classify them as chisel-ended tools. Even if we assume, however, that they represent a special variety of bifacial planes, the distinction between Level I and Levels II and III (taken together) in the proportion of Bifacial to unifacial planes remains unchanged.

[2] J. de Morgan (1896), Figs. 72–3. Also collection of the Institut de Paléontologie humaine, Paris, specimens registered as from Toukh and Khattarah, 1919.1. See also W. M. Flinders Petrie (1915), p. 76 and Figs. 160–4.

[3] Information kindly given by Miss G. Caton-Thompson.

[4] British Museum Collection ; registration No. 1930–5–9–16 (given by G. Brunton).

[5] G. Caton-Thompson and E. W. Gardner (1934), p. 20 and Pl. XXXV. Less characteristic implements are also known from the Oasis of Siwah, where they are undated. See collection of the Museum of Archæology and Ethnology, Cambridge, specimens registered 24.1114.

12. *Scrapers* (Pl. LVIII, 54–76, and Pl. LXVI, 47–57).

This is the largest single class in the settlement and it is represented by no less than ninety-four specimens. Yet it is of a banal character and cannot be of more than general interest. The scrapers are of various kinds and are usually made of struck flakes, with a few specimens of natural ones. They are usually of a simple character though some of them are multiple scrapers (e.g. Pl. LXVI, 56, which combines an end-scraper with a hollow one in the form of a lateral notch). On the whole these scrapers may be divided into the following types and sub-types :

(a) A thick core or hoof-shaped type (Pl. LVIII, 63, or Pl. LXVI, 47). Apart from cores which may have been converted into core-scrapers (e.g. Pl. LXI, 5) there is only one such specimen. It comes from Area 1100.

(b) Large scrapers or "*racloirs*" (Pl. LVIII, 64–65, and Pl. LXVI, 49). These are large specimens which are usually made from sheets of tabular flint with their margins neatly trimmed. Sometimes they have fairly clear preparations for hafting (see description of above-mentioned specimens in list of illustrations, Section VI).

(c) Ordinary side-and-end scrapers of round, ovate or elongated shape. They are usually made of struck flakes and sometimes exhibit preparations for hafting. According to the thickness of their working edge they may be sub-divided into two sub-types :

(1) With thick working edge (about 7 mm. or more) (Pl. LVIII, 54–58 and 62, and Pl. LXVI, 50–51).

(2) With relatively thin working edge (less than 7 mm.) (Pl. LVIII, 66–67 and 70–75, and Pl. LXVI, 52–56).

(d) Scrapers on end of blade (Pl. LVIII, 76). The true "*grattoir sur bout de lame*" is hardly represented in the collection at all. A similar type of tool, however, will be described later under the title of scraping knives.

(e) Keeled scrapers (Pl. LVIII, 59–61, and Pl. LXVI, 48).

(f) Hollow scrapers (Pl. LVIII, 68–69, and Pl. LXVI, 57). The latter example is a multiple specimen of curious shape, which exhibits interesting preparations for hafting (or holding in hand ?) (see description in list of illustrations, Section VI).

The distribution of this class and its types within the settlement may be noted briefly. The scrapers show the same character as some of the other main classes in that although they are fairly well distributed over most of the site they tend to be concentrated in certain squares (compare charts, specially that for Level I). They occur right through the three levels, though they become slightly more abundant in the top level. The general abundance of this class at Armant is not an unusual feature, as scraping tools are usually much in use in such settlements. The occurrence of such a variety of types (and also of such large numbers), however, is not without some chronological significance. The true Neolithic industries of Egypt are known to be rather poor in scrapers. This applies to the early settlements of Lower Egypt (Merimde and Fayyoum) as well as to the Tasian (so far as is known) and even to the Badarian. On the other hand, this tool becomes more and more abundant in post-Neolithic times. Armant cannot be regarded as an exception to this fairly general rule. There is little of interest concerning the occurrence and distribution of the various types of scrapers in the settlement. The true high

core-scraper or push-plane which G. Caton-Thompson considers to have started in the Badarian[1] is represented in the settlement by a single (and somewhat atypical) specimen (Pl. LXVI, 47). On the other hand, the "*racloirs*" are fairly well represented though they are in no way comparable with the "*racloir en éventail*" of Ma'adi (*vide supra*, Section II). The occurrence of this type in Levels II and I only (especially in the latter), is an interesting piece of evidence as to the relatively late chronological place of this large type. As to the ordinary side-and-end scrapers and the keeled and hollow types, they are nearly all of the common varieties. Taken together, they afford some link between Armant and other Predynastic industries. Yet the almost complete absence of any real "end of blade" scrapers cannot be passed unnoticed. This tool is fairly well represented in other Predynastic industries, not only in graves but also, as shown by Hemmamiah,[2] in settlements. Their scarcity in Armant shows that even in this common class of tools, the similarities between the various settlements of Upper Egypt were not absolute.

13. *Bifacial Knives-Fragments* (Pl. LIX, 77–79 and 84).

This is a small class which is poorly represented. The specimens are practically all in fragments (though some are nearly complete). Some of them are thick and unfinished or badly finished, while others are thin and fairly well pressure-flaked. It is interesting that, so far as could be ascertained from fragments, the tools belong to one variety, that of the round-based bifacial knives. In ordinary Predynastic industries these would be regarded as Early (Amratian) and Middle Predynastic generally,[3] though the earliest representatives of the "comma" type appear as early as S.D. 33.[4] It is also interesting to note that none of the specimens recovered from the settlement shows any signs of having been ground to shape and then re-flaked, following the technique which became so popular in certain categories of bifacial knives in Middle Predynastic times. It would be rather difficult to regard this omission as being entirely accidental.

14. *Sickles* (Pl. LIX, 80–83, 87–102, and Pl. LXVII, 58–67).

This is, on the other hand, a fairly abundant and important group. The sickles are both of the bifacial and unifacial (or blade) types, and most of them show definite traces of utilisation. The types and sub-types may be briefly set as follows :

(a) Bifacial sickles. These are represented by a relatively small series (only seven specimens). They include an exceptionally fine specimen of a double-pointed variety (Pl. LXVII, 60). The existence, however, of a rectangular specimen (Pl. LXVII, 58) may perhaps serve as an indication that the industry also included specimens with one squared and one pointed end (that is, long triangular.)[5]

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[1] See G. Caton-Thompson (1928), pp. 76–7.

[2] See G. Caton-Thompson (1928), Pl. LXXVIII, 1–5 and Pl. LXXIX, 30–33 and 44, etc. They are especially characteristic of the upper levels of the settlement.

[3] See G. Brunton (1928), p. 61.

[4] See W. M. Flinders Petrie (1901), p. 23 ; also G. Brunton (1928), p. 61.

[5] Two such long triangular specimens would be usually hafted each on one end of the rectangular specimen. The squared ends of the three specimens would fit together in the groove in a similar way to the reconstruction seen in H. Junker (1932), Abb. 5.

(b) Unifacial blade-sickles.[1] This type is much more abundant than the preceding one and also richer in variety. The tools are usually made of long flakes which have sometimes been worked both on the serrated and the other edge. Taken as a whole, however, they seem to have had one working edge only. According to the work on the edges (and especially to whether it is applied on the upper face or on the flat one), they may be sub-divided into the following sub-types :

(1) Sickles made of rough and irregular blades or flakes (Pl. LIX, 89–92).
(2) Of simple blade with one squared and one pointed end (or with both ends squared) and with hardly any lateral denticulation at all (Pl. LXVII, 62).
(3) Of blade with denticulated edge worked on the upper face and other lateral edge worked inversely (i.e. on the flat face) (Pl. LIX, 97, or Pl. LXVII, 63).
(4) Of blade with its denticulated edge worked on the flat face (i.e. inversely) and its other edge worked (sometimes only slightly) on the upper one (Pl. LIX, 102, and Pl. LXVII, 64–65).
(5) Of blade with both its denticulated and its other edge worked inversely (Pl. LIX, 99–100).
(6) Of blade with denticulated edge worked inversely (i.e. on flat face) and other lateral edge and the two transversal ends backed steeply (Pl. LIX, 101).
(7) Of blade with denticulated edge worked on both faces and other edge slightly (or not) touched (Pl. LXVII, 66).
(8) Of blade with denticulated edge worked on both faces and other edge worked inversely (i.e. on flat face) (Pl. LIX, 98).
(9) Of blade with denticulated edge worked on both faces and other lateral edge and one or the two transversal ends backed steeply (Pl. LIX, 96, or Pl. LXVII, 67).
(10) Special type of backed sawing or sickle-knife (or saw), usually with a steeply trimmed back and a very slightly serrated or untouched working edge and with one of its transversal ends squared and the other pointed (Pl. LIX,93–95).

As to the significance of the occurrence of these tools in the settlement and the light they may throw on relations with other cultures, it may perhaps be better to speak about each of the two main types separately. Among the bifacial sickles the above-mentioned double-pointed specimen is of special importance. It has one serrated and relatively straight lateral edge and one unserrated and gently curved one. Also its cross section is not symmetrical, as it is thicker on one side than on the other. The nearest datable analogy to this type comes from Badari.[2] On the other hand, the other specimens of the bifacial sickles of the settlement are of a more symmetrical, though less fine, character. They usually have a perfectly symmetrical cross section. They belong to a variety which, though seemingly dwindling, appears to have persisted through the Predynastic phase proper. One of them (Pl. LIX, 88, or Pl. LXVII, 61 ; see also description of specimen in list of illustrations, Section VI) exhibits the only probable trace of

[1] This type is called blade-sickle, that is sickle made of a blade, and should not be confused with the denomination sickle-blade which is sometimes applied to both bifacial and unifacial types.

[2] See G. Brunton (1928), p. 37, and Pl. XXVIII, 2 and XXIX, 4. Other similar specimens (which are, however, not datable with certainty) appear to come from Predynastic cemeteries ; see Fig. 65 in H. Breuil (1931).

grinding before re-flaking. One of its edges appears to have been ground to shape before it was serrated. This may perhaps offer a link with the polishing and re-flaking technique (on knives) which, as already mentioned, became popular in Middle Predynastic times.

As to the blade or unifacial type, their large number (twenty-seven) and wide variety indicate that they were more characteristic of the industry. It is also interesting to note that while Level III has yielded only two sub-types and Level II only three, Level I has yielded as many as seven. This shows that as time went on the industry became richer not only in the number of these agricultural tools but also in their variety. This may serve as an indirect indication of the increasing importance of agricultural economy in the life of the settlement. Also the existence of seven sub-types in Area 1100 may reflect on its chronological place in relation to the other parts of the settlement, though it should be noted that no levels have been worked out, and consequently the sub-types from there represent the whole of the archæological deposit from bottom to top. As to comparisons with other industries it may be safe to correlate this type with the abundant varieties of blade-sickles which are well represented right through the true Predynastic (post Badarian) phase. Nothing can be said as yet about the exact chronological place of the various sub-types, but it may be noted that the somewhat rectangular sub-type with steep trimming on its back and two transversal ends (e.g. Pl. LIX, 96 and 101), appears to afford a link with the Late Predynastic stage (though it is also known from the Middle Predynastic stage).

15. *Blade-* (*and Flake-*) *Knives*[1] (Pl. LIX, 103–127, Pl. LXVII, 68–73, and Pl. LXVIII, 74–81).

This is the second largest class in the collection and is represented by eighty-seven specimens. The tools are made of ordinary blades and flakes which vary in length and breadth. On the whole, however, they are of larger dimensions than any of the cores found in the settlement could have produced ; and it is evident that they must have been struck and prepared at some flaking site outside the settlement. The striking platform is invariably simple (i.e. unfaceted) though in some cases it exhibits the so-called " longitudinal " preparation (on this see description of specimen 69 of the drawings in list of illustrations, Section VI). The blades vary in the type and extent of lateral and terminal re-touch, and, on this basis, may be roughly divided into the following types :

(a) Rough or simple blade or flake with little or no lateral trimming (Pl. LIX, 103 and 105–108, and Pl. LXVII, 68–69).
(b) Simple blade with tip squared or trimmed obliquely on the upper face (Pl. LIX, 111, or Pl. LXVII, 70).
(c) Simple blade with tip trimmed obliquely on the flat (inverse) face (Pl. LIX, 112, or LXVII, 71).
(d) Blade or flake with lateral re-touch on upper face on one or two of the lateral edges, and perhaps also on tip (Pl. LIX, 113, or Pl. LXVIII, 74).
(e) Blade with one lateral edge worked inversely (i.e. on flat face) and the other intact or showing utilisation only (and tip sometimes trimmed on upper face) (Pl. LIX, 104, and Pl. LXVII, 72).

[1] The term Blade-knife is here used to indicate the tools made of unifacial blades and flakes and should not be confused with the denomination knife-blade which is sometimes used for bifacial knives.

(f) Blade with inverse re-touch along both of its lateral edges (or with one edge worked inversely and the other worked on both faces) and with tip usually trimmed on upper face (Pl. LIX, 110, or Pl. LXVII, 73).
(g) Blade with " alternate " lateral re-touch (i.e., one edge worked on upper face and the other on flat one) and also with tip usually squared, rounded or pointed (Pl. LIX, 126–127, and Pl. LXVIII, 78–79).
(h) The so-called " twisted " blade-knife (Pl. LIX, 114).
(i) Special type of " scraping knife " with its tip rounded into scraper form and opposite end sometimes worked into a semi-tang. One or the two of its lateral edges are trimmed on upper face, but some specimens exhibit inverse re-touch or trimming on one of the lateral edges. This type is rather highly specialised and the specimens should not be confused with the ordinary scraper on end of blade (see also description of specimens in list of illustrations, Section VI) (Pl. LIX, 117–125, and Pl. LXVIII, 75–77).
(j) Rectangular blades with the two transversal ends squared but with relatively little re-touching on the lateral edges (Pl. LIX, 115–116, or Pl. LXVIII, 80–81).

The general distribution of the blades within the settlement does not call for any special note except perhaps that they are more evenly distributed than the other main classes. As to their occurrence in the levels it is interesting to point out that while Level III has yielded four types only, Level II yielded six and Level I as many as nine. From a chronological point of view the abundance of this class and its types is not without significance. The true Neolithic and Early Chalcolithic (Badarian) in Egypt are essentially bifacial industries. Blades occur here and there, but they are usually of the simple type. The fact that Armant has an almost entirely unifacial (that is blade) technique renders it safe to place it entirely within the post-Neolithic phase. For further precision we have to depend on certain of the types mentioned above. Type " b " occurs in Level 3 ft. 6 in. to 4 ft. at Hemmamiah (i.e. in the transitional stage between the Badarian and the Early Predynastic or Amratian).[1] In our settlement the trimming of the tip of a knife is known as early as Level III, but the true types which can be compared with those of Hemmamiah occur only in the top level. This may perhaps be taken as an indication of the survival or persistence of this type of knife well into the Predynastic phase proper. It is interesting to note that, so far as we know, none of the Hemmamiah specimens shows any trimming of the tip on the flat (inverse) face (like our type " c ") instead of the upper one. Another type of special interest is type " g " (alternate lateral re-touch). This occurs in Levels II and I. It is also known from other Predynastic industries, including that of Hemmamiah. In this latter settlement it does not seem to occur below the 3-ft. Level, that is, the lower Middle Predynastic stage.[2] Indeed evidence is now gradually accumulating to show that this interesting technique of alternate lateral re-touching, which has thus far turned up (in any appreciable numbers) only from Egypt and its adjacent desert regions, may serve as one of the most valuable points in helping to establish an approximate chronological scale for the Predynastic industries. Its occurrence on blade-knives seems to mark the very beginning of the Middle Predynastic stage.

[1] See G. Caton-Thompson (1928), p. 76.

[2] This is at least true of the material in the University College Museum (now removed to St. John's Lodge, Covent Garden, London), and the University Museum of Manchester. Between them these two collections represent nearly the whole of the flint material from Hemmamiah.

Type " h " (" twisted knife ") is represented by one piece which is unfortunately registered as 1000, i.e. either from surface or from some uncertain level. It is fairly common in other Predynastic industries (grave material) and its varieties range from the late Early (Amratian) to the early Late Predynastic.[1] Type " i," on the other hand, does not seem to have always been distinguished from the ordinary types of scrapers on end of blade. The fact that it was used as a knife (or scraping knife) and not just as a scraper is now fairly well established on the evidence afforded by the study of the twenty-one specimens from Armant (see description of illustrated specimens in list of illustrations, Section VI). This type is known from other Predynastic industries,[2] and it seems to have a fairly wide range. It occurs right through the three levels of Armant. And finally we may mention type " j " (with squared ends), which is represented by two specimens only (which come from Level I and Area 1100).[3] Its chronological range in other industries (grave material) still needs precision, though it appears generally to belong to the Late Predynastic phase and the beginning of the Old Kingdom. It should be pointed out that our two (or three) specimens have squared and not curved transversal ends, and this may reflect on the relative chronology of the two varieties.[4]

16. *Points and Javelin-heads* (Pl. LX, 129–135, and 137–138, and Pl. LXVIII, 82–83).

This is a small and somewhat irregular class. The specimens include a variety of crude (Palæolithic-like) and fine pieces. According to their form and technique they may be divided into the following types and sub-types :

(a) Massive *coup-de-poing*-like points (Pl. LX, 129).
(b) Flake and blade points :
  (1) Short and crude (Pl. LX, 130–132).
  (2) Long and finely finished (Pl. LX, 134).
  (3) Special type of thick flake point with steep lateral re-touching along the edges (Pl. LX, 133 ; see also description of specimen in list of illustrations).
(c) Bifacial javelin- or spear-heads :
  (1) Short and broad (Pl. LX, 137–138, and Pl. LXVIII, 82).
  (2) Long and narrow (though thick) (Pl. LX, 135, or Pl. LXVIII, 83).
  (3) Double pointed. This is a very doubtful sub-type and is represented by no typical specimens (Pl. LIX, 82 ?).

[1] Petrie attributes a number of the datable varieties of this type to S.D. 34–63. See W. M. Flinders Petrie (1915), pp. 122–24 and Figs. 189–194. See also reference in G. Caton-Thompson and E. W. Gardner (1934), p. 69.

[2] For Hemmamiah specimens see G. Caton-Thompson (1928), Pl. LXXX, 80 and 84.

[3] One of these two specimens (Pl. LXVIII, 81 ; see description in list of illustrations) shows friction gloss and may have served as a sawing knife or blade-sickle. A third specimen has been noted in the group retained by al-Mat-haf al-Misri (Egyptian Museum, Cairo) registration No. 57616. It bears the field registration of 1000, and may have come from the surface. The group of implements in the Egyptian Museum has been examined only briefly by the writer. It is small and does not materially affect the conclusions arrived at in the present study.

[4] On the evidence of certain specimens found in Royal Tombs of the beginning of the Dynastic phase, W. M. Flinders Petrie (1915, p. 124) ascribes the sub-type with curved ends to the earlier half of the 1st Dynasty, and thinks that these blades " steadily deteriorate to the end of the dynasty, and become flat-ended (i.e., squared) in the 2nd Dynasty." The evidence from Armant is not in harmony with this, as our specimens (with squared ends) are not preceded (at least in the settlement) by the variety with rounded ends. Neither would it be at all feasible to ascribe our specimens to the Dynastic phase. As already mentioned, the exact chronological range of this type of blade-knife, and also the relative abundance of its two varieties in the Late Predynastic, the Protodynastic and the Early Dynastic phases, are still open matters.

The possible utilisation of these tools needs no comment. We may point out, however, that specimen 83 on Pl. LXVIII, is unique in so far as it retains the bulb on its inverse face. This renders it difficult to assume that it was used as an arrow-head. Indeed it is probable that many of the triangular types of the so-called " arrow-heads " of the Egyptian Neolithic and post-Neolithic may have been actually utilised as javelin- or spear-heads.

As to the distribution of this class within the settlement, the tools seem to occur right through, though, as we shall presently see, it is probable that they took the place of the fine, real arrow-heads in the top level. It may be also noted that the crude (in some cases Palæolithic-like) specimens are by no means confined to the lower levels. Nothing can be said at present in the way of cultural connections between this group of weapons and those from other industries.

17. *Arrow-heads* (Pl. LX, 136 and 139–141, or Pl. LXVIII, 84–87).

The arrow-heads have been separated from the points because although they serve a similar purpose they differ in the technique (apart from affinities with some of the bifacial points). The specimens from the settlement are, on the whole, triangular and of fine finish, and they have either a straight base or a very slightly hollow one. They are represented by seven pieces only, amongst which no ascertained specimens come from Level I (compare Distribution Table below), nor from the group registered as 1000 (largely surface). Although it is not known whether any of the three specimens registered as " Cultivation " may not have come out of a horizon corresponding to Level I or the surface, it may be reasonable to infer that on the whole, the arrow-head has been abandoned in the upper level of the settlement and that its place was largely taken by ordinary (and in some cases crude) points and javelin-heads. This may perhaps be taken to indicate a decline in the technique of preparing hunting weapons—a decline which is interesting in view of the already noted (also *vide infra* classes 21–23) perfection of agricultural tools in the upper part of the settlement. This may perhaps throw indirect light on the gradual changes which were taking place in the social economy of the Armant society.

As to the chronological value of this class, it may be recalled that while in the true Neolithic (at least in the North) and Early Chalcolithic (Badarian) arrow-heads are abundant and varied in sub-types, they seem to have gradually gone out of use or become somewhat degenerate and less varied in the true Predynastic phase. At the very close of Predynastic times (or rather in the Protodynastic and Early Dynastic stages) new types of tanged, narrow and so-called " pistiliform " arrow-heads come again into use, probably as weapons in fighting rather than just for hunting.[1] It is interesting to note that the Armant specimens can only be regarded as surviving types of the early variety, as they are entirely different in form and technique from the " pistiliform " group.

18. *Borers* (Pl. LX, 142–149, and Pl. LXVIII, 88).

This is, on the other hand, a banal class which need only be mentioned in brief. The specimens are either made of irregular nodules or thick flakes with massive butts, or of narrow blades. In some cases they show traces of battering and use. In many examples too the butt-end has been prepared for hafting (see description of specimens in list of

[1] For such specimens see W. M. Flinders Petrie (1915), p. 124 and Fig. 203–5.

illustrations ; Section VI). According to their form and technique the specimens may be divided as follows :

(a) Borers with narrow pointed neck (or boring part) and a massive butt. These include two sub-types :
  (1) With the boring neck trimmed steeply on both lateral edges (Pl. LX, 142–143, and 149).
  (2) With boring neck flaked on upper face on one lateral edge and on flat face on the other (Pl. LX, 144).
(b) Borers made of long narrow blades and usually with steep trimming along the two lateral edges (Pl. LX, 145–147, and Pl. LXVIII, 88).
(c) So-called rod or " dreikanter " type, with approximately triangular cross section and with flaking nearly all over its three faces (Pl. LX, 148).

Nothing of special interest can be said about the distribution of the specimens within the settlement or the cultural connections they may establish with other industries. It may be pointed out, however, that the rod type appears to be fairly common in many post-Neolithic cultures in desert regions and, as pointed out by G. Caton-Thompson (in the Fayyoum), this may have some connection with the existence of the natural " dreikanter " in such regions.[1]

19. *Burins*. (Pl. LX, 150–155, or Pl. LXIX, 89–94).

This class is small in number but diverse in variety. The specimens are made of flakes which are either thin or relatively thick. They are usually single burins ; though there is one multiple specimen. A few of them show definite traces of utilisation. According to the known varieties of burins, the Armant specimens may be classified as follows :

(a) Simple burins of the *bec de flute* type (Pl. LX, 154–155, or Pl. LXIX, 89–90).
(b) Angle burins of the following sub-types :
  (1) With straight transversal (re-touched) end (Pl. LX, 153, or Pl. LXIX, 91).
  (2) With convex or oblique trimmed edge (Pl. LX, 152, or Pl. LXIX, 92).
  (3) With concave trimmed edge (Pl. LX, 151, or Pl. LXIX, 93). (The bottom end of this specimen is also a *bec de flute* burin).
(c) So-called " transversal burin " (i.e. with transversal facet) (Pl. LX, 150, or Pl. LXIX, 94).

It may therefore be stated that the six ascertained specimens from the settlement represent no less than five types and sub-types. This is important because it shows that we are not just dealing with stray specimens which may illustrate a cultural contact with some other industry, but with a class which shows a highly developed and specialised technique.

The possible use or uses of the burins in the present settlement are not very easy to determine. Burins or gravers are usually regarded, at least in the Upper Palæolithic of Europe, to have served for engraving on wood, bone, or stone. As may be seen from other chapters of the present work, however, the settlement is exceedingly poor in artistic remains.[2] Such remains may have decayed, but, on the whole, it seems more plausible to think that the burins were

[1] See G. Caton-Thompson and E. W. Gardner (1934), p. 22. The date of these rods in the Fayyoum is B group. Their association with the A phase is not ascertained.

[2] A small piece of engraved limestone, however, has been recovered.

put to some other use. Recent experiments have shown that even in Europe these tools may have been used for re-touching implements.[1] Another possible use is for cutting skins.[2] But perhaps one of the most pronounced needs to which a burin can answer in a settlement like Armant would be to engrave wood for hafting. In this respect it should be remembered that in a large number of the classes of the Armant industry (*vide supra* and also list of illustrations), the preparation of one end of the tool for hafting is a remarkably persistent feature.

Very little, on the other hand, can be said about the distribution of the burins within the settlement, except that they seem to occur right through. As to their value in indicating cultural links, this must await a more thorough study of this class of tools in Egypt. Unfortunately, burins are not always easy to identify and up to recent years there was a tendency to place them, wherever they may occur, in the Upper Palæolithic. We have already pointed out that it was largely on the evidence of their profusion in the station of Nag' Hammadi that Ed. Vignard has placed that settlement (or group of flaking sites) in the " Aurignacian." It should be pointed out, however, that in the light of very recent evidence the story of this tool is becoming more and more complicated. Up to date, this story may be briefly stated as follows: In Palestine, burins (both made of crude flakes and on tips of cordiform hand-axes) occur in the Upper Acheulean.[3] Similar occurrence of the " *coup de burin* " on an Upper Acheulean hand-axe (though on the butt-end) has also been recently reported from Khargah Oasis.[4] But up to now no ascertained occurrence of the burin has been reported from the Middle Palæolithic proper. On the other hand, it becomes very predominant in the Upper Palæolithic, especially the Aurignacian and Capsian facies. It is interesting, however, that in the Upper Palæolithic facies of Egypt (the Sabylian or Sebilian and its associated sub-facies) the burin is entirely unknown. The so-called micro-burin appears in the Final Palæolithic of many countries (including Egypt), but if recent experiments by Vignard are right it had a separate line of descent from the true burin.[5] Then the burin seems to make an independent reappearance in post-Neolithic times. It has so far been reported only from Palestine (where it is reported from what appears to be very Early Bronze)[6] and from Egypt.[7] In the former country it is represented (up to now) by simple specimens made of rather crude flakes, while (as shown by Nag' Hammadi and now by Armant) Egyptian specimens include a number of highly specialised varieties.[8] Now that most of these varieties occur definitely in association with other unmistakably

[1] See report on a discussion in the *Bull. de la Soc. préhist. franç. t.* XXIX, Paris, 1932, pp. 92–3.

[2] If one tries to cut a skin in two (or to cut a strap off it) by holding it in the hands and cutting with a knife, it is usually very difficult to get a straight line, as the cut can be easily deflected from its required course. A more practical method would be to spread the skin on some hard, level ground and cut or engrave through it with a burin's edge in a vertical position. The possibilities of such a method, however, still await confirmation by experiment.

[3] R. Neuville, " L' Acheuléen supérieur de la Grotte d' Oumm-Qatafa (Palestine)," *L. Anthropologie*, t. 41, Paris, 1931, Fig. 12, Nos. 1–3, and Fig. 18, Nos. 1–7.

[4] Information kindly given by Miss G. Caton-Thompson, see her forthcoming publication.

[5] See recent work by Ed. Vignard, " Les Microburins Tardenoisien du Sébilien ; Origine du Microburin " Ex. du Congres Préhistorique de France, X^{e}, sess. 1934., pp. 66–106.

[6] See R. Neuville (1933), p. 130 and Fig. 14, Nos. 1–3.

[7] Also in N.W. Africa (station of Abd-al-Azim in the region of the Grand Erg occidental) the burin appears to have been found in association with very early Neolithic material, though no date can be given to it with certainty. See reference in H. Breuil (1931), p. 88.

[8] Amongst these may be noted the " transversal burin " which does not seem to have any close parallel outside Egypt. Our specimen from Armant (Pl. LXIX, 94) is not very typical because its facet is oblique. For other specimens with perfectly transversal facet, see Ed. Vignard (1921), Pl. VIII, and (1929), Pl. IV.

DISTRIBUTION TABLE
OF THE CLASSES, TYPES AND SUB-TYPES OF IMPLEMENTS IN THE SITES AND LEVELS OF THE ARMANT SETTLEMENT

Classes, Types & Sub-Types. / Sites and Levels.	Cores and Tool-Cores. 1.	Discs and Discoidal Forms. 2.	Sling-Stones. 3.	Atypical. 4.	Polished Axe. 5.	Flaked Axes. 6. a.	b.	c.	d.	Total.	Flaked Adzes. 7. a.	b.	c.	Total.	Re-edging Flakes. 8.	Dibbles or Digging Picks. 9. a.	b.	c.	d.	Total.	Chisels and Chisel-ended Tools. 10. a.	b. 1.	b. 2.	b. 3.	Total.	Planes. 11. a.	b.	Total.	Scrapers. 12. a.	b.	c. 1.	c. 2.	d.	e.	f.	Total.	Bi-facial Knife Fragments. 13.	Sickles. 14. a.	b. 1.	b. 2.	b. 3.	b. 4.	b. 5.	b. 6.	b. 7.	b. 8.	b. 9.	b. 10.	Total.
1100	5		1			1	2			3		2		2			1			1		1		1	2				1		4	5		1		11	1	1		1			1	1	3		1	1	10
Cultivation				1		4	4	2		10						2	1	1	3	7	1		1		2		2										2	1										3
1000	8	4		5		13	7	7		27		1	2	3	2	1		2	3	6						2	6	8		2	2	6				10	4	2	1							1	4
LEVEL I.	43	10	7	21		5	22	2	1	30	2	4	1	7	4	2	3	1	2	8			1		1	2	8	10		4	15	21	1	4	4	49	6	2	1		1		2	1	1	2	11
LEVEL II.	20	7		7		3	9			12	2	3		5	2								1	3	4	4	7	11		1	4	7		1		13	2		2	1						1	4
LEVEL III.	8			12	1		3			3			1	1	1	1	2			3						3	4	7			4	4	1	1	1	11	2		1		1						2
Total of Three Levels.	71	17	7	40	1					45				13	7					11					5			28								73	10										17
GRAND TOTAL.	84	21	8	46	1					85				18	9					25					9			38								94	15										34

Classes, Types & Sub-Types. / Sites and Levels.	Blade-Knives. 15. a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	Total.	Points and Javelin-heads. 16. a.	b. 1.	b. 2.	b. 3.	c. 1.	c. 2.	Total.	Arrow-heads. 17.	Borers. 18. a. 1.	a. 2.	b.	c.	Total.	Burins. 19. a.	b. 1.	b. 2.	b. 3.	c.	Total.	Fabricator. 20.	Hammer-stones. 21.	Grinders. 22.	Quirn. 23.	Pebble-polishers. 24.	Area and Level Total.
1100	2			4					7	1	14		1					1	1	2	1			3			1			1						56
Cultivation.	2				1						3								3													1				32
1000	4				1		1	1	2		9				1	1		2				1		1			1			1		1				96
LEVEL I.	9	2	1	9	2	2	1		7	1	34	1	1	1	1	1	1	6		2		3	1	6	1					1	1	10	6	1	3	275
LEVEL II.	9			2	2	1	2		3		19		1			2		3	2	1	1			2		1				1			1			115
LEVEL III.	3			2	1				2		8	1		1				2	1		1			1	1				1	2		1			1	67
Total of Three Levels.											61							11	3					9						4	1	11	7	1	4	457
GRAND TOTAL.											87							14	7					13						6	1	13	8	1	4	641

post-Neolithic material, the "Aurignacian" date suggested by Vignard can no longer be tenable. Indeed, further occurrences of this tool in other post-Neolithic settlements may be confidently hoped for as a result of future excavations.[1]

20. *Fabricators* (?) (Pl. LIX, 128).

This is a doubtful class and is represented by one specimen only (and perhaps a few atypical ones). A full description of the specimen is given in the list of illustrations and nothing need be added here. Fabricators (used in re-touching stone implements) are known chiefly from the Upper and Final Palæolithic, but their occurrence here, like that of several other Palæolithic-like tools, should not be taken to indicate a Palæolithic date.

21. *Hammer stones* (Pl. LX, 156–161, and 165).
22. *Grinders* (Pl. LX, 162–164, and 168).
23. *Quern* (Pl. LX, 169).
24. *Pebble Polishers, or Burnishers* (?) (Pl. LX, 166–167).

These four classes, largely made on material other than flint, may be dealt with together (for material of which they are made see description of specimens in list of illustrations : Section VI). The hammer stones are either spheroid or elongated. Some of them are combined hammers and anvils (Pl. LX, 161). The grinders also show different forms as they are either spheroid or very elongated. As to the quern fragment (the only specimen of its kind), it comes from Level I. And finally the pebble rubbers or polishers are really nothing more than small fancy pebbles of quartz which show no trace of utilisation. It is a matter of guess-work whether they were used as pot-burnishers, or as fine grinders (for grinding paint or other such material in small receptacles, such as an Unio shell, or on palettes). As they are only four in number, it may be even said that they are just fancy pebbles brought to the settlement either accidentally or for no practical purpose (perhaps by children ?).

Amongst other possible uses, the hammer stones may have served for crushing grain before grinding it. As to the grinders and the quern there can be no mistake about their use. The distribution of such tools connected primarily with agricultural food within the settlement is not without interest. Although they occur sporadically in Levels III and II, they become abundant only in Level I (see Distribution Table). This is in harmony with what has already been pointed out about the increasing importance of equipment connected with agricultural life from the lower level upwards.

As may be expected, no cultural or chronological inferences of any value can be made out of the study of these tools.

Section V. Summary and Conclusions : The Problem of Correlation and Chronology.

We have now completed the survey of the classes, types and sub-types of the Armant industry. It has been found that it contained no less than twenty-four classes made up of some seventy-three

[1] We have already noted that it is probable that some of the still unpublished material from Ma'adi may include a number of burins. It should be pointed out, however, that it is certain that this tool does not occur in the Predynastic settlement of Hemmamiah. Nor is it likely to turn up from the truly Neolithic industries.

types and sub-types. It is hoped that sufficient detail has been given to make the illustrations on Pls. LVII–LXIX serviceable for future reference. The system of classification adopted here is essentially a technological one (combining both technique and typology). The difficulties in adopting any more ambitious, chronological system of classification are too clear for comment. The classes and other divisions outlined here are, of course, not watertight—several of the implements have a multiple character while some of the classes also have an ill-defined technological character. However, the classification adopted here offers a fairly satisfactory basis for discussion along lines, which, in spite of their many limitations, have yielded material and evidence of sufficient interest. It has been found wiser, in the present state of our knowledge, to limit this system of classification to our present settlement; and so the classes and types outlined and their arrangement into consecutive groups can only apply to Armant. The classes have been given numbers in order to facilitate quotation in any future work of comparison, though perhaps the addition of the letters " Ar." (indicating Armant) before the numbers may be useful for working purposes. In any more comprehensive study of the flint industries of Neolithic and post-Neolithic Egypt, however, these numbers, and indeed the whole of the present arrangement, will almost certainly have to give place to a more embracing system of classification. But the time is far from ripe for such a work of general correlation.

The technological treatment of the Armant industry has brought out a number of points that may reflect both on the local technique of the settlement and the general morphology of the flint industries in late prehistoric Egypt. On broad lines, the industry represents a flaking technique which has very little or nothing to do with the grinding and polishing processes. These latter processes are represented only by one polished axe and a single probable specimen of a bi-facial sickle with ground and reflaked serrated edge. At the same time the bi-facial technique is poorly represented and the main body of the industry belongs to the unifacial or blade facies. Furthermore, the industry has other characteristic features, among which the process of re-edging and sharpening by means of " *coups de burin* " is perhaps the most conspicuous. This sharpening of edge shows so many variations on axes, adzes, dibbles and true burins, that it can only be regarded as a highly specialised and well established technique and not just a casual element which may have been borrowed through contact with some other culture. But perhaps the most interesting feature of the industry from the point of the general technological evolution is the occurrence of large numbers of crude and other Palæolithic-like tools. These have been traced chiefly among cores and other cognate tools (discs, sling-stones), atypical artefacts, dibbles, crude scrapers, points and burins. The sling-stones recall very primitive tools of somewhat ill-defined Palæolithic date, while the dibbles resemble in appearance, though not in details of technique, Upper Acheulean (or even so-called " Chalossian ") types.[1] Others still (burins) are indistinguishable either in form or in technique from the truly Upper Palæolithic specimens. The occurrence of all these types at Armant *in situ* and in unmistakable association with perfectly datable post-Neolithic groups of artefacts cannot fail to help in establishing our conceptions of the technological sequence of flint industries in Egypt on a more sound and perhaps less illusionary basis. In particular it should be noted that these Palæolithic-like artefacts are more abundant and more varied in the upper level of the settlement. In some cases

[1] Does the existence in a late prehistoric settlement of such a specimen as No. 37 on Pl. LXIV with its trihedral cross-section reflect on the question of the much discussed existence of a so-called " Chalossian " technique in the Lower Palæolithic ?

they appear only in that level. This not only helps to increase the chronological gap between them and the similar artifacts of the true Palæolithic—thus diminishing the possibility of regarding them as sheer survivals from that period—but it also renders it all the more difficult to associate the beginnings of Neolithic and Early post-Neolithic industries in Egypt with such technological developments in other regions as that which led to the appearance of the Campignian facies. This is important because in recent years there has been a tendency to interpret the occurrence of such types in Egypt as indicating that the earliest Neolithic of that country represents a cognate development to the Campignian of Europe—both starting from some common source with surviving Lower Palæolithic tradition.[1] The new light shed on this question by the Armant material renders it difficult to accept such a suggestion in explanation of the origins of Egyptian industries in the Neolithic and post-Neolithic phases.[2] This latter question, however, will be further alluded to when we come to consider the problem of chronology a little later.

That the industry of Armant is essentially a locally developed facies has already been pointed out in the previous discussion. The tools were partly made on the spot (as shown by the occurrence of unfinished and other broken and re-worked specimens), though in all probability the greater part of the artifacts were prepared (and perhaps even finished) at some flaking site or sites somewhere in the neighbourhood.[3] As to the indications which the assemblage of tools found in the settlement may give regarding the social economy and " *genre de vie* " of its people, it may be broadly stated that, on the whole, tools connected with hunting are greatly overwhelmed by those connected with cultivation.[4] It may be also noted that whereas in the upper level the former group of tools shows a marked technological degeneration (e.g. from fine specimens of arrow-heads to crude flake and core points and sling-stone-like artifacts), the latter group (connected with agricultural life) becomes more elaborate and finer in finish. This is a feature to be expected in the phase with which we are dealing; but to have it confirmed by the changes in the flint equipment of a settlement lends welcome support to the argument.[5] It gives an illustration—if indeed such be needed—of the help that can be derived from the study of implement groups from archæological levels. Unfortunately the exact value of such a study cannot be fully assessed until a thorough and primarily experimental investigation has been undertaken on the possible utilisation of the various classes of tools.

[1] See more particularly O. Menghin (1932a), p. 16 and (1932b), p. 88. Also less definite reference in E. Baumgärtel (1928), pp. 105–109; also E. Baumgärtel and F. Brotzen (1927).

[2] Even if we accept the assumption that part of the Palæolithic-like features of the late Neolithic and the post-Neolithic of Egypt represented an introduction from outside, such an introduction could have taken place only after the cultures have been almost fully developed in that country.

[3] It is not improbable that the station of Nag' Hammadi where Vignard (1929), p. 299 collected no less than 300 axes and 800 burins—unusually large numbers (especially in the case of burins) to be collected from the surface of a single settlement in which no excavations were undertaken—may have constituted the main flaking site for most of the area between Armant and Nag' Hammadi.

[4] The argument that the scarcity of hunting weapons in the settlement was due to the fact that such weapons were used and lost outside the settlement, applies equally well to some, at least, of the agricultural tools (e.g., sickles).

[5] It should be also pointed out that such a change in the social economy of a human group can have been a very slow process only. It reflects in an interesting way on the question of the chronological duration of the life of the settlement. It must be added, however, that the gradual increase in the importance of agriculture in the social economy of the Armant society does not necessarily mean that cultivation was not an important element in the life of earlier societies in Egypt. There is ample evidence from other settlements as to the important role played by agriculture in the economy of the earliest Neolithic societies thus far discovered in the country.

As to the distribution of the finds within the settlement this has been put in summary form in the three charts (in the present volume), the three small dot-plans on Pl. LXIX, and the Distribution Table at the end of Section IV. It may be added that although Levels III, II and I have yielded 67, 115 and 275 artifacts respectively (making an approximate proportion of 24:42:100:) the number of " classes " represented by their tool-assemblages was 18, 17 (or 18)[1] and 22 respectively (making an approximate proportion of 82:82:100:).[2] This shows that in spite of the relative scantiness of their remains, Levels III and II must be regarded as definite archæological horizons. As to the lateral distribution of the tools a fair idea about this can be gained by a comparison of the three plans on Pl. LXIX. The specimens have been illustrated by one dot each and, in the absence of a complete record of the exact " *Fundplatz* " of each specimen within its square, the dots have been placed as near the left-hand margin of the square as possible. The general distribution of the dots brings out certain points of interest. In Levels III and II the squares numbered with the letters D, E and F (and the figures 1–6) are practically empty while they become especially rich in tools in Level I. On the other hand, those numbered with the letters A, B and C (and the figures 1–6) show exactly the opposite feature.[3] Similar changes may also be noted in other parts of the settlement from one level to the other. Squares G 7–14, H 7–14 and J 7–14 were exceedingly poor in tools in the bottom level but became exceptionally prolific in the two upper ones. J14 yielded no tools from Level III, two tools from Level II but as many as fifteen (the largest number from any single square) from Level I. Square H8 tells a closely similar story. On the other hand, K8 and M11 were the richest squares in Level III but became exceedingly poor in the upper two levels. Such changes cannot be entirely regarded as accidental. The changes in the proportions of the various classes (to each other) in the various squares to which incidental reference has been made in Section IV (compare also the three charts) tend to show that there was an unevenness in the distribution of the artifacts not only in their total numbers within a square but also in the classes they represent. It is evident that we are dealing here with a proper " Settlement " and not just with an accumulation of midden which was eroded by some natural agency from a settlement on some higher spur, or which has been tipped and accumulated haphazard. The real point for debate is whether the concentration of groups of tools (in some cases made up of large numbers of specimens representing only a few classes, while in others including a small number of artifacts but representing a relatively large number of classes) corresponds in any way to habitations within the settlement. No remains of such habitations have been discovered in the site, and the question remains largely a matter of opinion. If, however, we accept the

[1] One specimen belonging to class 21 has certainly come from Level II, but it was included in the surface material registered as 1000 because its Square letter and number could not be ascertained.

[2] In the present chapter, however, the system of working out percentages of the various classes of tools, has not been adopted, except occasionally. The relative importance of these classes cannot be always safely assessed in relation to the total of the implements found in the same level. As already mentioned in a previous footnote, certain classes or type of implements were used and lost on the field, while others were used (and lost) within the settlement. We may note, for example, that, if taken at its face value, the overwhelming percentage of scrapers in Level I (17·8 per cent of the total of its artefacts) must give a distorted picture of the activities of the people of the settlement at that stage. On the other hand, various other classes, types and sub-types occur in very limited numbers, and their cultural (and, in some cases, chronological) value would be lost if these numbers were expressed in percentages. In dealing with the flint equipment of a settlement, therefore, percentages must be used with reserve. The case is different with pottery.

[3] It would be difficult to attribute the scantiness of the material found in A, B, and C (Figs. 1–6) in Level 1 to Roman disturbance in this area, as in spite of the existence of such a disturbance in other parts of the settlement the flint groups were found there.

possibility of some correspondence between the distribution of the flints and that of the habitations, there must have been a certain amount of lateral movement in the latter (but always within a relatively small area) from one level to the other. This would, of course, be, in no way, a strange feature for a settlement.[1]

And finally we may come to the question of cultural and chronological connections between Armant and other settlements and cultures of late prehistoric Egypt. In Section IV this question has been approached in the light of the main classes of tools, and it may be useful now to summarise it by chronological stages. The true Neolithic of N. Egypt has shown itself to be entirely different in technique and typology from the industry of Armant. No connection of any acceptable kind could be established between the two industries. The first signs of such a connection are to be found (in the form of planes) in the Fayyoum B stage. The material so far published from the Tasian of Upper Egypt is also different from our industry. Certain unpublished remains from Mustagiddah, however, show strong connections with Armant; but the place of these remains within the Tasian culture still needs defining. If they prove to be of true Tasian, they may indicate that certain classes of tools appear there before their advent at Armant, though, so far as can be judged at present, such a possibility does not seem to be a very likely one. On the other hand, there would be less discrepancy if they were ultimately proved to represent some infusion of an Armant-like industry into a facies with some surviving Tasian tradition. The Badarian culture proper shows again very little relation to Armant. The knives with trimmed tips which may have started in the Badarian, appear to have continued in the Early Predynastic (Amratian) phase, and, consequently, their presence at Armant may not necessarily be an indication of Badarian date. Unfortunately, the only specimen with fairly definite Badarian affinities (a bifacial sickle, Pl. LXVII, 60) is registered as " Cultivation " and its level cannot therefore be ascertained.[2] On the whole, therefore, while there is a certain presumptive cultural connection with Badari, it is not possible (on the evidence of the flint industry) to assign a Badarian date even to the beginning of the Armant settlement. On the other hand, the connections with the Early (Amratian) and Middle Predynastic stages are very abundant. Taken as a whole, the greater part of the datable tools (e.g. the polished axe, the arrow-heads, the blade-knives with alternate re-touch, the blade-sickles, etc.) can be safely assigned to these stages. As to the Late Predynastic, this is only represented by a very limited number of tools, and even if we assume that the settlement has continued to be inhabited during part of this stage, it must have been in a dwindling state and almost deserted. Speaking in general terms, therefore, from the data afforded by the flint industry—worked on entirely separate lines from the pottery and other remains which have been treated in other chapters of the present work—the Armant settlement may be assigned to the Early (Amratian) and Middle Predynastic stages with a possibility that it may have continued (perhaps intermittently) during part of the Late stage. The possibility of an extension of the date before the Early Predynastic (Amratian) is not very clear.

But the story is not as simple as that. It should be made clear that in spite of similarities

[1] Furthermore it is clear from the plans on Pl. LXIX that there is a general concentration of artefacts on the Western side of the settlement (right-hand side of the plans). This may be safely taken to indicate that the site was not exhausted by excavations in this direction.

[2] Also it should be noted that it is not known whether this type of double pointed, and somewhat asymmetrical bifacial sickle did not survive after the passing of the Badarian phase proper. We have already mentioned the possibility of its occurrence in Predynastic cemeteries (*vide supra*, Section iv, Class 14).

between Armant and other Early (Amratian) and Middle Predynastic cultures, there are also certain marked features of difference. Armant has yielded a number of classes of tools (flaked axes, dibbles, etc.) which have so far been found in settlements in neighbouring regions (between Armant, or a little to the south of it, and Nag' Hammadi with an extension westwards into Khargah and a less marked extension East of the Nile in the district of Mustagiddah), but not in any of the typical Predynastic cemeteries or even in the settlement of Hemmamiah. On the other hand, Armant did not yield some of the typical and sometimes highly specialised Predynastic tools and weapons such as the fine rippled knives, the fish-tail knives or lances, the mace-heads, etc.[1] It may be too early to ascribe such positive and negative differences between Armant (or rather the Armant-Nag' Hammadi region with its extensions) and the true Predynastic cultures further North as indicating any ethnological differences ; but in any case their cultural significance cannot be overlooked. It is conceivable that during this phase of Egyptian prehistory, there were at least two main facies of culture (as represented by the flint industries), one largely centred round Armant and Nag' Hammadi, and the other in more northerly centres. The two culture areas, however, must have overlapped, and sporadic settlements and also cemetery areas representing one may be found in the other.[2] But, in the present state of our knowledge, such a suggestion can be indicated only in the vaguest outline, and it must await further definition or correction by future works.

If we may now have a final glance at the Neolithic and post-Neolithic industries of Egypt and on the position of Armant within the culture sequence of the flint industries of late prehistoric Egypt, the story may be summarily put as follows : The true Neolithic cultures of Egypt still stand on their own (except perhaps in the case of the Tasian). An interesting point brought out by the Armant material is that these early Neolithic industries cannot be reasonably associated in their origin with the Campignian and other cognate industries of other regions. Indeed up to now no technological connection can be established between the Neolithic flint industries of Egypt and those of any of the adjacent regions (not even surface material).[3] The most plausible possibility is that these industries have had a local origin, perhaps in the valley itself, and that their prototypes, thus far not traced on the desert surface, may be actually under the coat of recent alluvium.[4] However this may have been, the Neolithic phase was followed by another of somewhat more complicated character. In Upper Egypt the Early post-Neolithic, as represented by the Badarian, was chiefly centred on the East side of the river, though it is now certain that it must have had wide cultural connections with the West. In Middle and N. Egypt the story is still obscure, but it may be that the marshy conditions of the lowermost

[1] Although it may not be improbable that such tools and weapons should turn up from the still unexcavated part of the settlement, the likelihood is that they should be very rare and may represent an introduction by commercial contact.

[2] For example, the area of Toukh and Nagadah must have been a mixed one.

[3] It should be remembered that up to now no true Neolithic has been found in Syria or Palestine.

[4] In this respect it should be recalled that the Egyptian Neolithic industries, as we know them at present, represent fully developed facies from the technological point of view. They must have passed through earlier stages of development. The late Upper Palæolithic phase was followed in Egypt by a phase of degradation of the bed of the river, and this may have rendered the bottom of the valley and the Delta habitable. The proto-Neolithic folk may have then descended from the increasingly drying-up desert to the borders of the river. This appears to have been followed by a phase of rise in the base-level (Mediterranean) and a weakening of the draining power of the river. Marshes developed and the ancestors of the Neolithic folk of the valley may have been driven to the edge of the desert where such sites as Merimde were established. However, this is a speculation.

parts of the valley (Delta), which started in Neolithic times, continued during the early stages of the post-Neolithic or Chalcolithic phase. The Early Predynastic (Amratian) seems to have been represented chiefly in Upper Egypt. According to the evidence of pottery, it was followed by a new culture phase in Middle Predynastic times, when closer analogies between Upper and Middle (and perhaps also N.) Egypt were established. The story of the whole of the Predynastic phase, however, seems to have been much more complicated than hitherto suggested (largely on the evidence of pottery whose limitations have already been referred to in the Introductory Section of the present chapter). Armant has shown that the flint industries of Upper Egypt during the Amratian phase were not homogeneous. There were at least two main facies. The two facies seem also to have continued during the Middle Predynastic stage. The Amratian, however, as represented in such settlements as Hemmamiah, became more closely associated with (or rather passed under the influence of) the Middle Predynastic as we know it (further N.), while the Armant group retained its distinctive facies, at least so far as the flint technique is concerned. There is no reason to assume that the industry of this area was overwhelmed by Northern elements, though it certainly borrowed some of these latter. It was probably not until the Late Predynastic stage that this culture (as represented in our settlement) dwindled and gave way. The lesson which Armant and its associated industries may therefore teach us is that while new culture elements advancing from N. Egypt appear to have spread into many parts of Upper Egypt in Middle Predynastic times, they did not entirely oust the older ones. The Northern contribution was chiefly manifested in the form of pottery and stone work, as well as certain classes of flint industry, especially those which combine the polishing and re-flaking techniques (which may perhaps represent a surviving tradition from the same dual technique we have seen in the true Neolithic of the N. ?) But Upper Egypt (or part of it) did not cease to maintain and develop its own tradition, especially in certain highly specialised classes of flint tools. It was not until the Late Predynastic that a more homogeneous (or rather, less heterogeneous) culture complex began to emerge in Upper Egypt as a whole. But the details of this process of assimilation which constituted the prelude to the formal unification of the whole country, lie well beyond the scope of the present discussion, and the story must be left where it stands.

Section VI. Descriptive List of Illustrations : An Addendum on the Details of the Technique and Typology of the Industry.

It has already been pointed out in Section IV of the present chapter that the details of the technique and typology of the industry could best be incorporated in a full descriptive list of illustrations. The specimens illustrated on the plates of photographs and drawings include a representative selection of the classes, types and sub-types of the industry.

In describing each specimen separately a certain amount of repetition may be unavoidable, but this will probably render the list more useful for purposes of reference. The scheme followed in numbering the specimens on the plates is to give a separate serial system of numbers for both the photographs and the drawings—1–169 for the photographs and 1–94 for the drawings. As a certain number of the specimens have been both photographed and drawn, their respective numbers on the photographs have been followed, between two brackets, by the numbers of

the corresponding drawings, and vice versa. The sign ϕ is used throughout to indicate " photograph " and the sign Δ to indicate " drawing." For example—specimen 3 of the photographs is the same as specimen 10 amongst the drawings so it has been numbered 3 (= Δ 10) on the photographic Pl. LVII and 10 (= ϕ 3) on the drawing Pl. LXI. This serial number is given near the top left corner of the illustrations. In the bottom left-hand corner (or as near to it as possible in case of lack of space) is given the " *Fundplatz*." In most cases this refers to the layer from which the specimen comes in the levelled area, and the square's letter and number (e.g. I L12, II M8, or III N12) as indicated on the plans, Pls. LXXVI–LXXVIII. In the case of certain tools whose *exact* position within a square has been fixed and marked on the plans (Pls. LXXVI–LXXVIII), a number (ranging in the case of the flint implements between 1001 and 1086) has been added (after the letter and number of the square). As to the specimens which were not found in either of the three layers, the *Fundplatz* of these was marked as 1000, 1100, or " Cultivation," according to the scheme already mentioned at the beginning of Section IV.

In the bottom right-hand corner (or as near to it as possible in the case of lack of space) are given the class, type and sub-type numbers and letter of the tool (or in some cases only the class or the class and the type number and letter). The classes and sub-types are indicated by figures and the types by small letters, e.g. 10 b_3.

It will be noted below that each illustration is described in a separate paragraph. At the top of the paragraph is given the following information : first the serial number of the illustration on the plate (followed by its equivalent number if the specimen has been both photographed and drawn) : then its *Fundplatz* and its class, type and sub-type numbers. This is followed by the colour of the tool and its maximum dimensions in centimetres and millimetres. There is not much variation in the colour of the specimens, which is mostly light brown, but it may be helpful, for purposes of identification in any later work on the material, to give some information about it. Also it may not be always of practical help to give the maximum length, breadth and thickness of the flint implements (especially in cases where this may give an erroneous idea about its average dimensions) but these, together with the linear scales given on the plates will help to give an exact idea about the shape and size of the tools.

PHOTOGRAPHS.

Plate LVII Φ.

1 ; 1,000 ; 1 ;
Very light brown (with grey spot). A reddish-buff cortex where left : 6·7 × 5·6 × 3·9.
A good specimen of a core (" *nucleus à lames* ") from which blades have been struck. Its striking platform has been only roughly prepared and the blade negatives run longitudinally along the face (shown in photograph). Small flakes, however, have been struck in a transversal direction off the other face (not shown in photograph).

2 ; I D4 ; 1 ;
Greyish brown with buff cortex ; 3·8 × 5·9 (Breadth) × 4·6.
A core off which small, narrow flakes have been struck. The flat, natural cortex-covered surface (shown top of photograph) has been used as a striking platform. Three natural flake scars on the face not shown in photograph have a deeper patination than the rest of the flake negatives.

3 ; (= Δ 10) ; I N 14 ; 3 ;
See description of Δ 10 (Plate LXI) below.

4 ; (= Δ 9) ; I H 8 ; 3 ;
See description of Δ 9 (Plate LXI) below.
The photograph shows the zigzag cutting edge corresponding to middle view in drawing.

5 ; I L14 ; 4 (or 2?) ;
Very light smoky brown with buff cortex where left ; 4·9 × 4·5 × 1·7.
A very fine discoidal form of an atypical tool which may have been used as a diminutive axe or adze. It is finely flaked nearly all over the two faces. The flaking, on the whole, leads toward the centre of the tool. The bottom end on the photograph is slightly zigzag, but it may have been used as a cutting edge. The opposite end is much cruder.

6 ; I G10 ; 2 ;
Brownish grey with brownish crust where left ; 5·5 × 5 × 1·7.
A fairly thin and typical disc. The flaking on the face shown on photograph, is finer than that on the opposite one. On the whole, the edge of the tool has a zigzag outline.

7 ; I H8 ; 2 ;
Very light brown ; 5·9 × 5·5 × 2·7.
A relatively thick disc which has been flaked practically all over the two faces. The flaking leads towards the centre of the tool and some of the flakes removed may have been utilizable in spite of their small size. The edge has a zigzag outline all round.

8 ; I J7 ; 2 ; (or 3?) ;
Light brown with whitish crust where left ; 4·7 × 4·3 × 3·5.
An exceptionally thick and crudely worked disc. It may even be regarded as a sling-stone. The flaking is rough and very steep, and the chips knocked off could not have been utilizable. The tool is worked all round except for a small part (bottom right-hand corner of photograph). It has a zigzag cutting edge.

9 ; II M8 ; 4 ;
Very light brown with buff cortex where left ; 7·3 × 4·7 × 1·5.
Fragment of an atypical tool. It is worked on both faces and may perhaps be regarded as a broken bifacial knife or chopper.

10 ; I F2 ; 4 ;
Light brown with buff cortex where left ; 6·8 × 4·1 × 2.
An atypical tool. It is difficult to place it in any of the recognizable classes of tools, but it may, perhaps, be an unfinished leaf-knife, or chopper. It is partly worked on both faces. A large flake has been struck off one of the sides of the face not shown in the photograph.

11 ; II N14 ; 4 ;
Light brown with thin buff crust ; 7·4 × 4·6 × 2·5.
An atypical tool, perhaps a chopper. Its working edge is fairly well finished on one face (shown in photograph) but only slightly flaked on the other. This edge is quite straight and it could not be regarded as of a zigzag type. It shows what appear to be traces of battering. The rest of the tool is covered with natural crust.

12 ; 1,000 ; 6a ;
Light brown with buff cortex ; 10·2 × 7·9 × 1·3.
An unusual axe made of a relatively thin sheet of tabular flint. Its cutting edge (bottom of photograph) has been neatly worked on both faces. The rest of the tool is largely covered with the original cortex.

13 ; Cultivation ; 6a ;
Smoky light brown with buff cortex ; 9·7 × 7·8 × 3.
A unique specimen of an axe (or a hoe ?) with a relatively broad working edge. It is made of a flint nodule whose shape was triangular. The cutting edge is fairly well worked on the face shown in the photograph. On the other face the work is more extensive but less fine.

14 ; I H 8 ; 6a ;
Very light brown with buff cortex ; 8·5 × 7·5 × 2·8.
A crude and presumably unfinished axe made from a flat flint nodule. The tool has been only roughly shaped on its edges. The edge shown in the bottom of the photograph appears to have been somewhat damaged, either in use or in the process of manufacture.

15 ; 1,100 ; 6a ; (or 7a ?) ;
Light brown ; 7·5 × 6·9 × 2·5.
An axe with one face (shown in photograph) flaked all over and the other worked only on the edges. The cutting edge has steeper trimming than the other edges, which makes it somewhat hollow. Unless this was due to unintentional breaking during use it is quite possible that the tool has been used as an adze. It appears also that the tool has been actually fashioned out of an earlier tool (or chipped nodule) which was somewhat wind-worn. However, this may have been, the second series of flaking which was responsible for the manufacture of the axe is quite fresh and shows no signs of wind or sand blasting.

16 ; (= Δ 14) ; See description of Δ 14 (Plate LXII) below.

17 ; I J 12 (1,035) ; 6b ; (or 6d ?) ;
Very light brown ; 9·8 × 6·4 × 2·8.
Flaked axe with one end (bottom of photograph) re-edged transversally on one face. This edge shows traces of battering and use. It is also probable that the opposite end was originally re-edged likewise, though the traces of this re-edging were obliterated by subsequent use. The lateral edges are straight and finely worked.

18 ; I M 8 ; 6b (or 7b) ;
Light brown with orange cortex ; 8·3 × 5·4 × 1·8.
A relatively thin specimen of an axe (or adze) with transversal re-edging on one face from one end only (bottom of photograph). This specimen has been made of tabular flint. A good deal of the cortex has been left, especially on the face not shown in the photograph. The cutting edge shows traces of battering and wear.

19 ; (= △ 19) ; See description of △ 19 (Plate LXII) below.

20 ; I K 10 ; 6b ;
Reddish brown with buff cortex where left ; 8·8 × 5·4 × 2·3.
Flaked axe with transversal re-edging along one end on one face (bottom of photograph). The cutting edge has been somewhat damaged as a result of use. Part of the cortex is left on the face shown in photograph but the other has been flaked all over.

21 ; (= △ 16) ; See description of △ 16 (Plate LXII) below.

22 ; I C6 ; 6b ;
Brownish grey with buff crust where preserved ; 8·2 × 5·4 × 2·2.
A special type of axe with exceptionally narrow cutting edge (bottom of photograph). This end of the tool was re-edged transversally on one face only. It shows distinct traces of battering and wear (giving a serrated outline in photograph). The opposite end (slightly damaged by recent break to the top left-hand corner of photograph) has been carefully trimmed into a gentle curve. As is also clear from the photograph it was thinned by longitudinal flakes for purposes of hafting. It is interesting that this specimen has acquired a thin, darkish patination since it was flaked (this is revealed by the recent break mentioned above). This, however, may be due to the special nature of the flint and the circumstances in which it lay.

23 ; Cultivation ; 6b ;
Very light brown ; 8 × 6·9 × 2·7.
A unique specimen of an axe (or hoe ?) semi-circular in shape. Its working end (bottom of photograph) has been re-edged transversally. It is somewhat battered with use. Curiously enough a great part of the surface of this specimen has a glossy appearance, and feels smooth when touched (effect of gloss shown on cutting edge, bottom of photograph). The gloss, at one time, must have covered the whole specimen, as isolated patches of it are left by the process of reflaking applied (after the gloss has taken place) especially on the upper (hafting) end of the tool. This later re-flaking is fairly regular and shows no gloss.

24 ; I J 10 ; 6b ;
Light brown with buff cortex where left ; 7·2 × 6·1 × 2·6.
An axe with a re-edged cutting end (bottom of photograph) which has been somewhat damaged by use. The upper part of the tool has what appears to be an arrangement for hafting. Although the notch at the top left-hand side of photograph was probably due, in the first place, to an accidental break, the one opposite it is definitely intentional. Between them, they make a neck suitable for hafting.

25 ; (= △ 24) ; See description of △ 24 (Plate LXIII) below.

26 ; (= △ 31) ; See description of △ 31 (Plate LXIII) below.

27 ; II L 14 ; 7b ;
Light brown ; 7·2 × 4 × 1·7.
A unique tool which may have been used as an adze. It has an elongated form and is flaked all over both faces. Its lower end (bottom of photograph) was re-edged by a transversal blow (applied from the bottom right-hand corner of the photograph). The cutting edge, however, has been partly damaged by subsequent use.

28 ; I M10 ; 7b ;
Light brown with buff cortex where left ; 5·4 × 3·9 × 2·5.
An exceptionally thick adze with a transversally re-edged cutting end. This end shows slight traces of battering. The opposite end has been steeply trimmed (perhaps accidentally ?) The tool has a roughly plano-convex section.

29 ; 1,000 ; 7c ;
Brownish-grey (banded) : 6·3 × 3·4 × 1·6.
An adze (or axe ?) with its cutting end (bottom of photograph) re-edged transversally on both faces. This end shows little traces of utilization. The tool has a fairly regular rectangular form but its cross section is asymmetrical.

30 ; (= △ 26) ; See description of △ 26 (Plate LXIII) below.

31 ; II M 13 ; 7b (or 7c) ;
Light brown with buff cortex where left ; 4·8 × 3·6 × 1·5.
A small but fairly regular adze with a cutting end (bottom of photograph) re-edged transversally on one face (or perhaps on the two). This edge was partly damaged at one side (left), but otherwise shows very little signs of utilization. As is clear from the photograph, the thickness of the opposite edge of the tool (top of photograph) has been reduced by longitudinal flaking (presumably for hafting). Apart from the break mentioned above, the tool has an almost perfectly rectangular shape.

32 ; I G 10 (1,015) ; 7b ;
Light brown with buff cortex where left ; 6·7 × 4·3 × 1·9.
An adze of fair size and with its cutting end re-edged transversally on one face (not shown in photograph). Its edge has been well battered with use. The opposite end (top of photograph) is rounded but also shows thinning by means of longitudinal flaking (presumably for hafting).

33 ; (= △ 27) ; See description △ 27 (Plate LXIII) below.

34 ; (= △ 25) ; See description of △ 25 (Plate LXIII) below.

35 ; (= △ 28) ; See description of △ 28 (Plate LXIII) below.

36 ; 1000 ; 8 ;
Very light brown ; 6·3 × 2·5 × 0·5.
An exceptionally thin transversal re-edging flake (" *éclat d' avivage* ") showing the flat bulbar face with the bulb to the left and the (broken) tip to the right. The amount by which the edge of the original axe was reduced by the removal of this flake could not have been more than two or three millimetres.

37 ; (= △ 29) ; See description of △ 29 (Plate LXIII) below.

PLATE LVIII Φ.

38 ; (= △ 32) ; See description of △ 32 (Plate LXIV) below.

39 ; (= △ 34) ; See description of △ 34 (Plate LXIV) below.

40 ; (= △ 35) ; See description of △ 35 (Plate LXIV) below.

41 ; 1,000 ; 9d ;
Greyish-brown with dark orange crust ; 11·5 × 5·7 × 4.
A dibble or digging pick with its tip bevelled transversally on one face (shown, though not clearly, in photograph) and longitudinally on the other.

42 ; (= △ 37) ; See description of △ 37 (Plate LXIV) below.

43 ; 1000 ; 9d (or 9b ?) ;
Light brown with buff cortex : 7·8 × 4·5 × 2·1.
An exceptionally small dibble or digging pick with its tip showing irregular transversal bevelling on one face (shown in photograph) and longitudinal bevelling on the other. The tip is sharp and shows little traces of utilization.

44 ; (= △ 38) ; See description of △ 38 (Plate LXV) below.

45 ; (= △ 42) ; See description of △ 42 (Plate LXV) below.

46 ; (= △ 41) ; See description of △ 41 (Plate LXV) below.

47 ; II G 8 ; 10b (or 11a) ;
Light brown with buff cortex where left ; 5·3 × 4·4 × 1·2.
An irregular adze-like chisel-ended tool (or bifacial plane ?). Its cutting edge is roughly straight but it has been badly damaged with use. The opposite edge has a pseudo-point on one side but it was probably hafted.

48 ; II G 9 ; 10 b 3 (or 11a) ;
Light brown with orange crust ; 5·1 × 4·2 × 0·9.
A rectangular adze-like chisel-ended tool (or bifacial plane ?) made of tabular flint. Both the lower and the upper edges (on photograph) show slight traces of use.

49 ; II N7 ; 11a (or 10 b2) ;
Light brown (veined) with buff patches (on either side) ; 6·7 × 5·3 × 1·1.
A special type of an adze-like bifacial plane or chisel-ended tool. The broad cutting edge (bottom of photograph) has been partly battered and damaged by use (break at the bottom right hand corner). The opposite end (top of photograph) has a tang arrangement. The tang has been thinned by means of a crude burin-like " *coup*," presumably to facilitate hafting. The tool has a plano-convex section (photograph showing flat face which is even slightly concave). It may have been used as a plane, a gouge, a chisel-ended tool, or even as an adze. It probably was put to more than one use.

50 ; II M 14 ; 11b ;
Very light chocolate with dim orange crust on flat face ; 4·9 × 4·6 × 1·5.
A relatively thick triangular plane with one face (shown in photograph) worked all over, and the other made of a flat natural surface which was untouched except for a slightly flat flaking near the pointed end. The working edge of the tool (forming base of triangle) has a scar (about its middle, on photograph) which has been produced by some violent and unintentional pressure flaking from the direction of the flat face. The scar had no effect at all on the flat surface of the plane. It is probable that it was produced by the use of the tool for scraping inwards (i.e., towards the user) with the flat face standing almost vertically and also facing the user. (It should be pointed out, however, that on the other specimens the utilization breaks and scars have affected the flat under-surface of the tools. The majority of these implements were therefore probably used for scraping or planing in a different way from the present specimen : i.e., for scraping outwards from the user, and with the flat under-surface downwards.)

51 ; I N 9 ; 11b ;
Brownish-grey (patchy) ; 5·7 × 4·6 × 1·1.
A triangular plane made of a struck flake. This is the only specimen of its kind. The piece is resting on the bulbar face which is not shown in photograph. The other specimens are all made either of tabular flint or of natural flakes (with a naturally flat under-surface). The upper face of the present tool (shown in photograph) is worked all over and has exceptionally steep trimming on its edges. The other face (bulbar) is untouched and the bulb at the narrow end.

52 ; (= △ 44) ; See description of △ 44 (Plate LXV) below.

53 ; (= △ 45) ; See description of △ 45 (Plate LXV) below.

54 ; 1,000 ; 12c 1 ; (or 12b ?) ;
Light brown with buff cortex on upper face : 8·3 × 6·5 × 1·8.
A massive ovoid scraper (or " *racloir* ") made of large natural flake. It is trimmed nearly all round. The other face (not shown in photograph) is made of a very gently curved (convex) natural fracture which has only a slight unintentional flaking. A cross section of the tool would be a squat oval with the upper part more domed than the other.

55 ; I J 7 ; 12c 1 ;
Reddish light brown (patchy) : 6 × 5·1 × 1·8.
A roughly worked tool which may have been used as a scraper or as a plane It is made of a flake, whose lower flat surface still retains the bulb on the narrow end. The transversal working edge (bottom of photograph) is summarily worked but shows extensive battering on the flat face.

56 ; I G10 ; 12c 1 ;
Light brown : 4·9 × 4·2 × 2·1.
A thick side-and-end scraper of roughly triangular shape. It has crude and steep trimming on two of its sides. The other face is quite flat.

57 ; I G 10 ; 12c 1 ;
Very light brown with buff cortex where left : 5·4 × 4·3 × 1·6.
A fairly well finished circular scraper made of a naturally fractured flake. Its edges are worked practically all round, though on the main working end (pointing downwards in photograph) the retouching is steep, while on the opposite end it is sloping. The natural surface of the other face of the tool is not quite flat but a partial effort has been made to render it so.

58 ; I L 8 ; 12c 1 ;
Brownish-grey with buff cortex where left : 6·3 × 4·1 × 1·7.
An elongated ovoid side-and-end scraper made of a struck flake. The trimming is fairly steep. The other face has a bulb on it.

59 ; (= △ 48) ; See description of △ 48 (Plate LXVI) below.

60 ; I M10 ; 12e ;
Light brown ; 6·7 × 4 × 1·7 ;
A somewhat elongated end-scraper made of a naturally fractured flake. The flaking on its working edge (pointing upwards in photograph) is sloping (that is, not very steep). It resembles fluting. The opposite end seems to have been reduced in thickness by bold flaking (perhaps for hafting ?). The specimen has a flat under-surface and a triangular cross section. It may be taken as a keel-scraper.

61 ; I L13 ; 12e ;
Smoky light brown with buff cortex where left : 4·5 × 3 × 1·3.
A small specimen of a keel-scraper made of a struck flake. Its working edge (pointing upwards in photograph) is flaked almost vertically, though the working cannot be quite described as fluting. The opposite end (which is the bulbar one) has been reduced in thickness by some bold sloping flaking (presumably to facilitate hafting).

62 ; 1,100 ; 12c 1 ;
Greyish light brown ; 6·5 × 5·4 × 1·6.
A crudely worked end-scraper made of a struck flake. Its broad working end is only roughly trimmed. There is, however, a deliberate effort to produce a tang on the bulbar end. The under-surface is untouched and the bulb remains on the ill-defined tang.

63 ; (= △ 47) ; See description of △ 47 (Plate LXVI) below.

64 ; I K11 ; 12b ;
Very light brown with orange-buff cortex where left : 11 × 7 × 1·2.
A large, relatively thick ovate scraper (or "*racloir*") on tabular flint. The average thickness of its working edge (right hand side of photograph) is about 4 mm. This edge has been somewhat rubbed with use. The opposite edge (left hand side of photograph) appears to have been thinned from both faces by means of bold flaking (perhaps for hafting). The other face of the tool is practically flat (natural fracture surface).

65 ; (= △ 49) ; See description of △ 49 (Plate LXVI) below.

66 ; II K12 ; 12c 2 ;
Light brown ; 8·4 × 4·8 × 0·9.
Large and somewhat irregular side-and-end scraper made of a struck flake. Its working edge is thinner on one side (right) than on the other (left). A very slight attempt has been made to remove part of the bulb from the under-surface.

67 ; (= △ 54) ; See description of △ 54 (Plate LXVI) below.

68 ; I K10 ; 12f ;
Light brown with buff cortex ; 5·3 × 2·5 × 0·9 ;
A hollow scraper made on a naturally concave side of an irregular flake. As its working edge is very thin (2 mm.) and somewhat serrated, it is probable that the tool may have also been used as a saw or sickle.

69 ; I F1 ; 12f ;
Red-brown (patchy) with dusty crust where left : 4 × 3·2 × 0·8.
A small notch making a hollow scar on the tip of a small flake. The notch shows signs of excessive use and there are two slight breaks on each side of it, on the under-surface. One of these latter resembles, in some respects, a "*coup de burin.*" The flake has the bulb on the under surface.

70 ; II N10 ; 12c 2 ;
Smoky light brown with buff cortex where left. 4·1 × 3·4 × 0·9.
A small, somewhat ovoid side-and-end scraper made of a struck and slightly twisted flake.

71 ; II H9 ; 12c 2 ;
Light brown (with grey patch) and buff cortex where left : 4·9 × 2·7 × 0·9.
A small side-and-end scraper made of a thin and somewhat elongated flake. The work is more pronounced on the lateral edges (especially the right hand side) than on the thin tip.

72 ; I M10 ; 12c 2 ;
Very light brown with buff cortex where left ; 3·5 × 2·9 × 0·8.
A very small side-and-end scraper made of a struck flake. It has steep trimming and resembles the thumb-scraper type.

73 ; I N9 ; 12c 2 ;
Smoky or greyish brown ; 3·9 × 2·5 × 0·8.
A small end-scraper made of a somewhat irregular flake. There is practically no work other than that on the curved tip.

74 ; I K11 ; 12c 2 ;
Very light brown ; 3·9 × 2·2 × 0·5.
A small tool made of an exceptionally thin flake. Both its lateral edges and its tip have been trimmed steeply on the upper face. The bulbar face is intact. The tool can be regarded either as a side-and-ends scraper or as a small knife-blade, with its tip irregularly squared.

75 ; I J10 ; 12c 2 ; (or 12d ?) ;
Light brown with buff cortex where left ; 5·4 × 4·5 × 0·8.
A broad but very thin flake with re-touched (squared) transversal edge. The average thickness of this edge is 1·5 mm. The retouching on it is sloping but the tool may have been used chiefly as an end-scraper, One of the lateral edges, however (right hand side in photograph), shows very slight traces of utilization (perhaps as a knife?).

76 ; III C1 ; 12d (or 15b ?) ;
Very light brown ; 5·8 × 3·7 × 0·9.
A blade tool of medium length. The tip of the blade is slightly trimmed from above in the fashion of an end-scraper ("*grattoir sur bout de lame*"). The left hand side lateral edge has an accidental break, but it may have been used as a short knife.

Plate LIX Φ.

77 ; I H14 (1047) ; 13 ;
Very light brown with buff cortex where left ; 7·4 × 4 × 1·7.
A thick and clumsy bifacial fragment (broken end at top of photograph). It may have represented an unfinished bifacial knife.

78 ; I G10 ; 13 (or 14a ?) ;
Light brown (smoky) ; 6·3 × 2·6 × 0·9.
A relatively fine and narrow bifacial fragment (broken end at top of photograph). It has a plano-convex cross section (convex face shown). The left hand side lateral edge has a very faint friction polish and it feels smooth when touched in spite of its being more battered than the opposite edge. The tool may have been used for cutting silica-bearing grass.

79 ; 1100 ; 13 ;
Light brown ; 7·3 × 3·8 × 0·8.
An exceptionally fine specimen of a broken bifacial knife. The pressure flaking is flat and fairly regular on both faces, and the cross section is a thin pointed oval. The lateral edges are fairly sharp and the base is narrow but rounded. There are no indications, however, that this knife was ground to shape before it was pressure-flaked.

80 ; (= △ 59) ; See description of △ 59 (Plate LXVII) below.

81 ; I O10 ; 14a ;
Very dark grey (almost black) ; 3·8 × 2·7 × 0·7.
A fragment (broken both ends) of a bifacial sickle. The serrated lateral edge (left hand side of photograph) shows friction gloss. The unserrated one is sharp but it appears to have been also used. The cross section of the tool is symmetrical and of a flat, pointed oval shape. One of its faces (shown in photograph), however, is slightly more convex than the other.

82 ; Cultivation ; 14a (or 16c3 ?) ;
Light brown ; 10·5 × 2·2 × 0·8.
A seemingly unfinished specimen of a double-pointed bifacial sickle. Neither of its lateral edges is serrated, nor do they exhibit any friction gloss. The cross section of the tool makes an asymmetrical double-pointed oval. The face shown in photograph is much more convex than the other. The two narrow ends of the specimen are flat and thin, but the tool may be also regarded as a double point.

83 ; (= △ 60) ; See description of △ 60 (Plate LXVII) below.

84 ; I J11 ; 13 ;
Greyish brown (veined) ; 6 × 5·4 × 1·3.
Broken rounded base-end of a bifacial knife. The specimen is fairly well made and its lateral edges may have been fairly sharp. The cross section is symmetrical and double convex.

85 ; I C5 ; 10b 2 (or 16c1 ?) ;
Light brown ; 5·9 × 3·4 × 1·3.
A chisel-ended tool of a more or less triangular shape. It is worked all over one face (shown in photograph) and on the greater part of the other (which retains part of its natrual flat surface). The tool has a more or less plano-convex section. Its transversal cutting edge is slightly battered and could only have been used as a chisel-end. It is not clear whether the tool may have also been used as a point.

86 ; 1,100 ; 10b 1 ; (or 16c2 or 14a ?) ;
Very light brown ; 8·6 × 2·5 × 1·2 ;
An elongated bifacial chisel-ended tool. One of its ends is pointed and the other squared. The latter shows definite traces of battering. A little above this end on the photograph may be seen a small part of a smooth surface. This, however, seems to be natural and could not have been produced by grinding or polishing. The lateral edges of the specimen are clumsy and unserrated, though it may be argued that we are dealing with a tool which may have, in the first place, been prepared as a bifacial sickle with one squared and one pointed end. At the same time the possibility of the tool having been prepared as a javelin-point cannot be excluded. The specimen has an asymmetrical double convex cross section, though its lower face (not shown in photograph), had a natural flat surface (which it partly retains just above the battered squared end).

87 ; 1,100 ; 14a ;
Very light brown ; 3·9 × 3·2 × 0·7.
Fragment of a bifacial sickle. It is finely worked and has a symmetrical thin double pointed oval section. The two lateral edges are fairly sharp, though the denticulated one shows very faint traces of friction gloss.

88 ; (=△ 61) ; See description of △ 61 (Plate LXVII) below.

89 ; I B1 ; 14b 1 ;
Grey and light brown (banded) ; 6·2 × 4 × 0·8.
Crude sickle made of a rough flake. The serration seen on part of one of the lateral edges of the flake is made from both faces. The face not shown in photograph retains the bulb on it.

90 ; III K8 (1069) ; 14b1 ;
Very light brown ; 9·2 × 4·6 × 1·1.
Sickle blade made of a crude flake (showing bulbar end). The flake appears to have been originally a re-edging flake (similar to Nos. 35–37 above). The serrated edge is worked on both faces and shows traces of friction gloss. The other lateral edge represents a wedge-shaped (and not a blunt) back. It appears, also, to have been partly trimmed inversely (i.e., on bulbar face shown in photograph), perhaps in preparation for hafting (?).

91 ; 1000 ; 14b 1 ;
Grey and smoky brown (patchy) with buff cortex where left ; 9 × 3·4 × 0·5.
Sickle blade made of rough elongated flake. The teeth are rather sharp, though they are not very well marked. The serrated edge is worked on the upper face only and it shows no traces of friction gloss. The other edge is hardly retouched at all, and it still has the cortex on it. The face not shown in photograph still retains the bulb on it.

92 ; IIK10 ; 14b 1 ;
Very light brown ; 4·6 × 1·9 × 0·4.
Sickle made of a rough blade. The teeth of the serrated edge (left-hand side in photograph) are worked mainly on the upper face of the flake and are not well marked. The other lateral edge has slight traces of utilization. The flat face of the flake (not shown in photograph) still retains the bulb on it.

93 ; 1100 ; 14b 10 ;
Very dark grey ; 5·4 × 1·3 × 0·7.
Simple saw or sawing knife made of fairly regular blade. One of the transversal ends is squared while the other is obliquely truncated into a semi-point. The tool is backed by almost vertical trimming, on one lateral edge. The other (working) lateral edge (left hand side of photograph) is very slightly serrated by means of small notches from the upper face. Although it cannot be regarded as a true sickle it shows clear traces of friction gloss.

94 ; I C5 ; 14b 10 ;
Very dark grey ; 5·5 × 1·5 × 0·7.
A median fragment of a narrow blade. One lateral edge (left hand side of photograph) is steeply backed, but the other shows only traces of utilization. It is difficult to determine the nature of the original tool, but it may have served as a knife-blade or as an unserrated sawing-knife.

95 ; I D6 ; 14b 10 ;
Very light brown ; 6·4 × 1·5 × 0·4.
A special type of what appears to have been a sawing-knife. One of its lateral edges (left hand side of photograph) is somewhat curved and steeply backed. The tip is also steeply trimmed into a point, while the other transversal end is squared. The tip, however, is too delicate to have been used as a point, though it may have served for boring. The unbacked lateral edge is not denticulated but shows definite signs of utilization, either as a cutting or, more probably, as a sawing tool. The lower face of the tool (not shown in photograph) is quite flat (the bulbar end having been broken off and the base of the tool squared with trimming on the upper face).

96 ; (=△ 67) ; See description of △ 67 (Plate LXVII) below.

97 ; (=△ 63) ; See description of △ 63 (Plate LXVII) below.

98 ; I L13 ; 14b 8 ;
Greyish-brown with buff cortex where left ; 5 × 1·3 × 0·4.
A sickle made of a narrow blade with its two transversal ends squared. The serrated lateral edge is worked on the two faces (but mostly on the upper one) and it shows clear traces of friction gloss. The other lateral edge is trimmed inversely (i.e., on the flat face not shown in photograph) and it has been slightly broken (top right hand corner of photograph).

99 ; I M14 ; 14b 5 ;
Light grey ; 4·2 × 1·7 × 0·5.
Broken fragment of a blade-sickle (break-line at top of photograph). Its serrated edge is worked inversely (i.e., on flat face) and shows friction gloss. The other lateral edge and the base-end (bottom of photograph) are also worked inversely. The specimen, which has a flat triangular cross section, appears to have suffered slightly from being in the fire.

100 ; 1100 ; 14b 5 ;
Smoky grey ; 4·3 × 2·1 × 0·5.
Median fragment of a blade-sickle. Both its lateral edges are worked inversely (i.e., on flat face) and the serrated one has friction gloss. The other face of the tool has a median ridge.

101 ; 1100 ; 14b 6 ;
Grey ; 3 × 1·4 × 0·6.
A fine specimen of a small rectangular blade-sickle. Its two transversal ends are squared by fairly steep trimming and one of its lateral edges (left hand side of photograph) is steeply backed. The other lateral edge (serrated one) is worked inversely (i.e., on flat face) and has friction gloss. The gloss is clear only on the upper face of the tool and appears to have been removed from its lower (flat) one by fresh re-trimming in order to re-sharpen teeth.

102 ; (=△ 64) ; See description of △ 64 (Plate LXVII) below.

103 ; 1,100 ; 15a ;
Light brown with buff cortex ; 11·1 × 2·3 × 0·5.
Simple long flake or blade, with no retouch on its edges. It may however, have been used as a simple knife, as one of its lateral edges (right hand side of photograph) seems to bear slight traces of utilization.

104 ; I K11 (1,024) ; 15e (or 15a ?) ;
Light brown with buff cortex ; 10·5 × 3·4 × 1·1.
Simple and rather crude flake or blade with one of its lateral edges (left-hand side in photograph) retouched inversely (i.e., on flat face) while the other is practically intact.

105 ; I F6 ; 15a ;
Brownish grey ; 7·9 × 1·6 × 0·7.
Simple elongated blade with no work and only very slight traces of utilisation on its lateral edges. Its tip is naturally pointed.

106 ; III C1 ; 15a ;
Brownish grey ; 7·5 × 1·5 × 0·4.
Simple long blade with no work, or even any clear traces of utilization on its lateral edges. It had a naturally pointed tip which has been broken. As is clear in photograph this specimen shows " longitudinal " preparation of striking platform (on this *vide infra*, description of specimen 69 of the drawings).

107 ; I L10 ; 15a ;
Light brown ; 5·7 × 2·5 × 0·4.
Simple and relatively short blade with one of its lateral edges (left-hand side in photograph) showing very fine trimming or traces of utilisation, while the other is untouched.

108 ; II O8 ; 15a ;
Smoky light brown with buff cortex ; 5·4 × 1·6 × 0·6.
Fragment (broken both ends) of a long narrow blade-knife. It shows traces of utilization only on one lateral edge (left hand side in photograph).

109 ; (=△ 69) ; See description of △ 69 (Plate LXVII) below.

110 ; (=△ 73) ; See description of △ 73 (Plate LXVII) below.

111 ; (=△ 70) ; See description of △ 70 (Plate LXVII) below.

112 ; (=△ 71) ; See description of △ 71 (Plate LXVII) below.

113 ; (=△ 74) ; See description of △ 74 (Plate LXVIII) below.

114 ; 1000 ; 15h ;
Smoky brown and light grey (banded) ; 8·7 × 2·5 × 0·8.
A unique specimen of a (" twisted ") knife-blade. Its straight back is worked on the upper face (shown in photograph) while its curved edge is worked mostly on the flat face. It should be noted that a bulb is still on the flat face (not shown in photograph) of the pointed end. The other end (bottom of photograph) is broken.

115 ; (=△ 80) ; See description of △ 80 (Plate LXVIII) below.

116 ; (=△ 81 ; See description of △ 81 (Plate LXVIII) below.

117 ; (=△ 75) ; See description of △ 75 (Plate LXVIII) below.

118 ; 1,100 ; 15i ;
Grey with whitish cortex ; 8·5 × 3·2 × 0·8.
Fine specimen of a scraping knife. The blade has one round and one pointed end, both being worked into the required shape by means of steep trimming on upper face. One of the lateral edges (left hand side of photograph) shows traces of utilisation.

119 ; (=△ 76) ; See description of △ 76. (Plate LXVIII) below.

120 ; I C6 ; 15i ;
Light brown with buff cortex ; 6·7 × 2·6 × 0·6.
Fragment of a scraping knife (broken end at bottom of photograph). It has its tip rounded and one of its lateral edges (right-hand side of photograph) trimmed steeply on upper face. The other lateral edge is intact and has cortex on it.

121 ; II G13 ; 15i ;
Very light brown with buff cortex ; 4·3 × 3·9 × 1·3.
Massive terminal fragment of a scraping knife. It seems to have been made of a natural flake or blade with a perfectly plano-convex cross section. It is trimmed (on upper face) on both its rounded end and lateral edges.

122 ; III J7 ; 15i ;
Dark grey ; 3·4 × 3·8 (breadth) × 0·6.
Terminal fragment of a scraping knife (broken end at bottom of photograph). The tip is rounded, with trimming on upper face, but the lateral edges seem to have been very slightly retouched.

123 ; 1,000 ; 15i ;
Very dark grey ; 6·1 × 2·8 × 1.
Terminal fragment of a scraping knife. The tip end (top of photograph) is rounded by means of trimming on the upper face (not shown in photograph). One of the lateral edges (left hand side of photograph) is worked inversely (i.e., on flat face), while the other shows only traces of utilization. The other face of the tool (on which the specimen is resting in photograph) has a median ridge giving it a flat triangular cross section. (N.B. This specimen is reproduced on a slightly smaller scale than the rest on same photograph.)

124 ; 1,100 ; 15i ;
Light brown with buff cortex ; 5·5 × 2·9 × 0·8.
A broken pointed fragment of a scraping knife (in this case the pointed end of the tool is the terminal one, while in Nos. 118–123, the terminal end of the tool is rounded and the bulbar one is pointed, or worked into a semi-tang). By comparison with specimens 117–119, it is probable that the pointed end of the present specimen was intended as a tang rather than a proper point. One of the lateral edges (left hand side of photograph) appears to have had fine trimming (on upper face) all along it.

125 ; I C5 ; 15i ;
Light brown ; 4·7 × 2·7 × 1·3.
Broken pointed fragment of a scraping knife. In this case the pointed end happens to be the bulbar one of the original blade, but the bulb was actually removed, or cut off, by very steep trimming (applied on upper face of tool) which produced the ill-defined tang. The specimen is relatively thick and has an almost triangular cross section. One of the lateral edges (right-hand side of photograph) appears to have been trimmed all along on the upper face, while the other has rather doubtful traces of inverse trimming on part of its flat face.

126 ; I E4 ; 15g ;
Greyish light brown ; 7 × 3·7 × 1·2.
Broken and rather clumsy specimen of a knife blade with alternate lateral re-touching. On the bulbar face, shown in photograph, the right hand side lateral edge has inverse retouching, while the opposite one is intact. This latter, however, is re-touched on the upper face of the tool (not shown in photograph). The broad end (top of photograph) is badly broken.

127 ; (=△ 78) ; See description of △ 78 (Plate LXVIII) below.
(N.B. The photograph shows the inverse or flat face of the tool represented by the drawing to the right-hand side. For photographic purposes, however, the piece was made to rest on one of the sides of its V-shaped back, so that in perspective (in the photograph) it looks narrower than on the drawing. This position, however, makes it possible to see not only the inverse work on the flat face of the lateral edge to the right hand side of photograph, but also the work applied on the upper face of the opposite edge. This latter appears as a dark marginal line on the left hand side).

128 ; I F1 ; 20 ;
Light brown (with whitish impurity) ; 7 × 3·8 × 1·1.
A fabricator or rather a fabricator's edge which has been struck off as a flake after it had been much battered. The specimen is actually an irregular flake which has been placed on its bulbar face for photographing. What appears to be a point is due to an accidental break. Originally the flake belonged to the edge of a larger piece. This edge was used for tool-making (retouching, etc. ?) until it got much battered (as shown clearly by line of battering near the left hand side edge of the photograph) and the flake was struck off and a new fabricating edge obtained. In spite of the slight impurity the flint of this specimen is of fine quality.

Plate LX

129 ; I R12 (1,076) ; 16a ;
Very light brown with buff cortex ; 6 × 4·6 × 2·4.
A crude thick point made from a somewhat flat nodule resembling a small "*coup de poing*." The pointed end is flaked on both faces but the butt is left largely intact, and has the original cortex on it (more so on the face not shown in photograph). (N.B. This specimen should not be confused with No. 43 on Plate LVIII. Though of approximately similar dimensions, the latter has a much more developed neck and passes better as a dibble. The present specimen, on the other hand, cannot be classified as such.)

130 ; I N9 ; 16b 1 ;
Light purplish brown with buff cortex where left ; 5·3 × 4·3 × 0·9.
A short triangular point made of a small natural flake of tabular flint (with cortex on side not shown in photograph). It is only worked very summarily on its edges from both faces.

131 ; II K10 ; 16b 1 ;
Light brown ; 4·3 × 3 × 1.
A short point made of a crude flake. Only the upper face of the flake is worked.

132 ; 1100 ; 16b 1 ;
Light brown ; 4·4 × 3·4 × 1·1.
A short point made of an irregular flake. Its edges are worked to a point by means of steep trimming, mostly from the flat face of the flake shown in photograph. The other face is hardly worked at all.

133 ; 1000 ; 16b 3 ;
Light brown and grey (patchy) with buff cortex ; 7·3 × 3·5 × 2.
A special type of a long point made of an exceptionally thick flake. It shows steep trimming all round the edges of the upper face of the flake. The inverse face has the bulb on it and is practically intact.

134 ; I F2 ; 16b 2 ;
Slightly reddish light brown ; 7 × 3·1 × 0·9 (bulb).
A fine long point made of a thin flake with a median ridge (on face not shown in photograph). Its lateral edges are finely serrated by means of minute inverse trimming (on flat face shown in photograph). Its edges, however, are very sharp, and there are no indications that they were used for sawing.

135 ; (=△ 83) ; See description of △ 83 (Plate LXVIII) below.

136 ; (=△ 84) ; See description of △ 84 (Plate LXVIII) below.

137 ; I O10 ; 16c 1 (or 17 ?) ;
Light brown with buff cortex where left ; 5·2 × 4·1 × 0·8.
A broad triangular arrow-head or point with broken tip. It is clearly worked on both faces, though the trimming on its edges is somewhat steep.

138 ; II O11 ; 16c 1 (or 17 ?) ;
Light brown ; 5·1 × 3·2 × 0·9.
A small and rather battered triangular point or arrow-head. The pointed tip seems to have been re-flaked for purposes of re-sharpening (the relatively fine re-flaking is clear in photograph). The base of the tool, however, is badly broken. It is feasible that in the first place it may have been used as a triangular chisel-ended tool with its transversal base as the working edge, and that when its base was damaged by use the tool was converted into a point or arrow-head.

139 ; (=△ 85) ; See description of △ 85 (Plate LXVIII) below.

140 ; (=△ 86) ; See description of △ 86 (Plate LXVIII) below.

141 ; (=△ 87) ; See description of △ 87 (Plate LXVIII) below.

142 ; I N13 ; 18a 1 ;
Greyish light brown with buff cortex ; 8·4 × 5 × 3·4.
Massive borer made from a flat nodule. Before the preparation of the point a large flake was knocked off the lower face of the tool, producing a somewhat flat surface (on which it is resting in photograph). The piercing point was produced by steep trimming on its right and left hand sides. It has a high, triangular cross section. Its tip is hardly abraded by use at all. The butt shows no preparation for hafting ; but its natural shape fits well into the hand.

143 ; II G9 ; 18a 1 ;
Brownish grey with crust of same colour ; 4·7 × 2·3 × 1·3.
A small borer made of a relatively thick flake. The inverse face of the flake (on which it is resting in photograph) is intact and the bulb is very flat. The boring point is prepared by steep trimming on its lateral edges, and its cross section represents a low triangle with a truncated point (i.e., a trapezoid). The tip of the tool is somewhat battered by use Its broad base-end has been thinned by means of flaking (perhaps in preparation for hafting ?).

144 ; III G14 ; 18a 2 ;
Brownish grey (banded) ; 4·4 × 2·6 × 1·1.
Borer (made of a flake) with flat neck and a relatively massive butt. The neck has alternate lateral retouching on its edges (i.e., one edge worked on upper face of the flake, as shown in photograph, and the other on the flat bulbar one). (N.B. This specimen is reproduced at a slightly smaller scale than the rest of the pieces on the same photograph.)

145 ; I L8 ; 18b ;
Very light brown with buff cortex where left ; 7·3 × 1·7 × 0·9.
A fine long borer with broken tip. Its two lateral edges have been trimmed steeply and its cross section is trapezoidal. It has a flat under-surface from which the bulb has been removed by a little flaking. Also the upper face of the base-end of the tool (bulbar) has been thinned or bevelled, by means of longitudinal flaking (bottom of photograph) which, together with the removal of the bulb, must have been intended to facilitate hafting.

146 ; I M13 ; 18b ;
Purplish light brown with buff cortex where left ; 4·2 × 1·5 × 0·9.
Broken terminal fragment of a borer. The lateral edges are steeply trimmed and the tip is blunt (perhaps by use ?). The under surface (shown in photograph) is quite flat.

147 ; 1,000 ; 18b ;
Light brown, 5·2 × 1·2 × 0·5.
A relatively flat borer made of an elongated flake. One of its lateral edges (left hand side in photograph) is backed all along it, while the other is worked steeply only on the tip (top of photograph). The tip of the tool is slightly battered by use, while the opposite end seems to have been prepared for hafting. A small bulb has been removed from the under surface by means of slight inverse trimming, while the upper face of the same end has been thinned by means of longitudinal flaking (clear in photograph).

148 ; I N 8 ; 18c ;
Smoky light brown ; 5·5 × 1·8 × 1·4.
A broken median fragment (broken both ends) of a massive long borer of the rod type. It may have originally been a natural "dreikanter," though its cross section represents a triangle with a truncated tip. All its faces have been flaked over. The photograph shows its lower flat face.

149 ; I G12 ; 18a 1 ;
Brownish-grey ; 4·7 × 2·5 × 1·7.
A small borer made of a thick flake with a relatively massive butt. Its lateral edges have been trimmed fairly steeply and the tool has a roughly triangular cross section. The tip is well battered by use. The photograph shows the bulbar face from which the greater part of the bulb has been removed by inverse flaking (perhaps to facilitate hafting ?).

150 ; (=△ 94) ; See description of △ 94 (Plate LXIX) below. (N.B. this specimen is reproduced at a slightly smaller scale than the rest of the pieces on the same photograph.)

151 ; (=△ 93) ; See description of △ 93 (Plate LXIX) below.

152 ; (=△ 92) ; See description of △ 92 (Plate LXIX) below.

153 ; (=△ 91) ; See description of △ 91 (Plate LXIX) below.

154 ; (=△ 89) ; See description of △ 89 (Plate LXIX) below.

155 ; (=△ 90) ; See description of △ 90 (Plate LXIX) below.

156 ; 1,000 (or II) ; 21 ;
Dark reddish ; 6·9 × 6·9 × 6·5.
Medium-sized hammer-stone of highly decomposed quartz-porphyry. It is well battered all round except on one end on which it is resting in photograph.

157 ; III N14 ; 21 ;
Very slightly reddish ; 5·6 × 5·5 × 5·2.
Small hammer-stone of fine grained granite. It seems to have been battered chiefly along the central belt. It is not clear whether the tool may have also served for grinding.

158 ; I J11 ; 21 (and 22 ?) ;
Very dark grey ; 5·8 (height) × 6 (breadth) × 5·7.
Small hammer-stone of some kind of finely cemented conglomerate or coarse sandstone. It is battered practically all over except on the one side on which it is resting in photograph.

159 ; I F5 ; 21 ;
Light brown ; 4·2 (height) × 5·1 (breadth) × 5·3.
Small hammer-stone of chert. It is not battered at all.

160 ; I H11 ; 21 ;
Very light or whitish brown ; 10·8 × 7·6 × 5·5.
A large elongated hammer-stone of chert. It is battered along the face shown in photograph and also on the broader transversal edge (right hand end of photograph).

161 ; I D4 ; 21 ;
Reddish quartz ; 13·5 × 9·9 × 5·1.
Combined hammer-stone and anvil made of a large quartz pebble. As is clear from photograph, the left-hand end of the tool has been truncated by use as hammer, while the central area on one of its faces (shown middle of photograph) seems to have been battered by use as anvil.

162 ; I E6 ; 22 ;
Greyish dark brown ; 8·6 × 8·2 × 5·3.
Broken fragment of a smooth grinder made of a large mudstone pebble. The smoothness of the specimen (especially that on the surface shown in photograph) cannot be all regarded as belonging to the original surface of the pebble. It must have been largely produced by rubbing.

163 ; I K11 ; 22 ;
Very light or whitish brown ; 6·3 × 6 × 3·9.
Small grinder made of a siliceous limestone pebble. The surface on which the tool is resting is much smoother than the one shown in photograph, and shows faint traces of rubbing.

164 ; 1,000 ; 22 ;
Light brown ; 10·3 × 3·4 × 2·4.
An elongated grinding stone of fine and well cemented sandstone conglomerate. It is rubbed on at least three of its lateral sides.

165 ; I K11 ; 21 (and 22 ?) ;
Reddish granite ; 4·7 × 4·5 × 4·4.
Small hammer-stone or grinder of fine grained granite. It may have served both for hammering and for grinding.

166 ; I L10 ; 24 ;
Light brown quartz ; 5·8 × 4·8 × 2·2.
Small quartz pebble. It shows no traces of utilization but may have been used as a polisher or burnisher (for pottery) or perhaps as a grinder (for grinding paint, etc., in large shell or on palette ?).

167 ; I H8 ; 24 ;
Light purple ; 4·2 × 3·3 × 2·2.
Very small quartz pebble. It shows no traces of utilization though it may have served the same purposes as the preceding specimen.

168 ; I H12 ; 22 ;
Whitish brown ; 5·4 × 5·2 × 4·9.
A small grinder of coarse but finely cemented sandstone. It was not found with the quern fragment below it, but has only been placed on it to show the latter's cavity.

169 ; I J9 ; 23 ;
Whitish brown ; 9·6 × 7 × 3·6.
A broken fragment of a grinding quern of fine conglomerate. It was not found in association with the grinding stone above it. They were photographed together in order to bring out the cavity of the surface of the quern.

DRAWINGS.

Plate LXI △

1 ; I J7 ; 1 ;
Light brown with buff cortex where left ; 6·4 × 8 (breadth) × 4.
Core with striking platform, shown above. The flint is somewhat impure. This is one of the largest specimens in the collection.

2 ; I N11 ; 1 ;
Light brown ; 3·7 × 4·2 (breadth) × 3.
Small core of a rough conical shape. The face shown exhibits three stages of flaking (left hand side of drawing) though in the last stage (topmost) the effort was unsuccessful and the flake struck was very short.

3 ; III C4 ; 1 ;
Light brown ; 5·3 × 2·9 × 2·8.
An ordinary small core from which several small flakes have been struck off All from a single flat striking platform.

4 ; I G14 ; 1 ;
Banded grey and greyish brown with buff cortex where left ; 4·2 × 4·3 (breadth) × 3·7.
A small core from which small narrow flakes have been struck. It recalls the Final Palæolithic types of core. The striking platform is shown up and a piece of the original cortex on the left hand margin of drawing.

5 ; II N1 ; 1 (or 12a ?) ;
Light brown with buff cortex where left ; 2·4 × 3·9 (breadth) × 2·8.
A very small core drawn with its striking platform below. Part of the cortex is still retained (top of drawing). There are indications of secondary trimming on the flaking edge (shown at bottom of drawing) and this make it possible that the core was re-adapted into a core-scraper.

6 ; II R13 ; 1 ;
Light brown with buff cortex where left ; 4·6 × 3 × 3·9.
An irregular small core. Although it had a flat striking platform (shown in middle view), not all the flakes (as shown in right hand side view) were struck off that platform.

7 ; III N12 ; 1 (or 2 ?) ;
Light brown with reddish tint and buff cortex ; 6·5 × 5·2 × 1·4.
An unusual discoidal type of core. It recalls (though only typologically) some of the Final Palæolothic types of core from which small flakes have been knocked from different directions.

8 ; 1,000 ; 1 ;
Light brown ; 7·2 × 5·2 × 3.
Core which is made of a broken piece of a former implement, probably an axe. One view (left hand side) shows the worked face of the core, and the other (right hand side) shows the original surface of the axe.

9 ; (= Φ 4) ; I H 8 ; 3 ;
Smoky brown with buff cortex where left ; 4·7 × 4·6 × 3·3.
Sling-stone made of small nodule. It has been worked alternately on one end. The alternating flaking (from the two faces) produces a zigzag cutting edge (shown in the middle view). One end is left with the original smooth and cortex-covered surface intact. This may suggest that the implement was used for throwing from a sling.

10 ; (= Φ 3) ; I N14 ; 3 ;
Grey brown on worked edge with dark olive natural surface ; 5·2 × 6·5 (breadth) × 2·6.
Sling-stone (?) made of a naturally broken fragment of a flat nodule. It is worked only on the upper edge (top of both facial views) but from both faces. The flakes chipped off that edge from one face alternate with those chipped from the other, thus producing a zigzag cutting edge, as shown in middle view.

11 ; III C1 ; 4 ;
Reddish-brown (veined) ; 4·9 × 4·9 × 2·1.
An atypical bifacial implement which may have been used either as an axe (cutting end shown at bottom and notches on sides for hafting ?) or as a multiple hollow scraper (?).

12 ; III L12 ; 4 ;
Smoky light brown ; 5 × 4·8 × 1·3.
An atypical discoidal form made of a thick flake whose edges have been mutilated by steep trimming from one face or the other all round. It has three or four somewhat pointed edges and may have been used as an atypical sling-stone (?).

13 ; I T13 ; 4 ;
Smoky light brown ; 4·7 × 5·5 (breadth) × 1·7.
A somewhat atypical tranchet. One of the faces is made of a natural fracture and is left flat (except for battering on edge). The other face is flaked all over. The cutting edge of the latter face is bevelled or re-edged transversally (making the tool into a tranchet), but it has been much battered with use.

Plate LXII △

14 ; (= Φ 16) ; Cultivation ; 6a ;
Light brown ; 8·5 × 5·7 × 2·4.
Finely finished flaked axe with no transversal re-edging on either of its ends. The end at the bottom of drawing, however, is better finished and seems to have been the cutting edge. The opposite end has a slightly zigzag outline, though it has been thinned (by longitudinal flaking) presumably for hafting. The lateral edges are fairly straight but in the lower part of the tool they converge inwards towards the cutting edge (compare also Photograph 16). This renders the tool better suited for cleaving.

15 ; I D5 ; 6b ;
Pale brown (smoky) ; 8·3 × 5·7 × 3.
Flaked axe with finely re-edged end. This cutting edge shows slight battering but no traces of gloss The other narrow end is thick (compare side view).

16 ; (= Φ 21) ; III N12 (1081) ; 6b ;
Greyish brown with smoky crust where left ; 10·5 × 6·4 × 2·9.
A fine specimen of a flaked axe with transversal re-edging applied on one edge from one face only. The flake knocked off must have been rather thick and consequently the present cutting edge is very much removed from the symmetrical axial centre of the tool (compare side view). The other narrow end has been prepared, but only for hafting. The lateral edges of the tool are fairly regular. One interesting feature is that whilst one face (left hand side) has been carefully worked by secondary flaking, the other has hardly been touched beyond the large primary flaking (except on hafting end).

17 ; I J12 (1,034) ; 6b ;
Light grey and greyish brown (veined) with brownish crust where left ; 9·3 × 6 × 2·2.
Broad and relatively thin axe with transversal re-edging applied on one end from one face only. The cutting edge shows only very little traces of battering and no gloss. The other narrow end has been prepared from both faces, presumably for hafting. Owing largely to the natural shape of the flat nodule from which the implement was made, the lateral edges of the tool are somewhat twisted.

18 ; III K13 ; 6b ;
Light brown ; 5·3 × 4·7 × 3·1.
Small and exceptionally thick axe with transversal re-edging applied on one end from one face only. The cutting edge shows traces of battering while the other end is too clumsy. This latter has been somewhat reduced in thickness by ordinary flaking, perhaps for hafting.

19 ; (= Φ 19) ; I L12 (1061) ; 6b ;
Greyish-brown (veined) with buff cortex where left ; 8·8 × 5·2 × 2·2.
An elongated flaked axe with transversal re-edging applied on one end from one face only. The cutting edge is not much battered, but it shows slight traces of gloss caused by utilization. The other narrow end appears to have been prepared for hafting.

20 ; I J13 ; 6b ;
Reddish smoky brown ; 6·4 × 4·8 × 2·7.
A small flaked axe with transversal re-edging on one end from one face only. It appears that after the piece had been re-edged (by a knock whose direction is shown by broken arrow to the extreme left), one of the sides of its working end was damaged (broken part shown by broken line). Then a small re-edging flake was struck off the same edge from the same direction as the first one (shown by solid arrow). This has rendered the damaged cutting end serviceable again.

21 ; I K11 (1,019) ; 6b ;
Light brown with buff cortex ; 9·5 × 6 × 2·8.
A fine specimen of a flaked axe made from a flat nodule with part of the cortex still left on the butt end. The cutting edge has been bevelled transversally from one face only. The re-edging was made by two transversal blows from opposite directions (indicated by arrows).

22 ; I M11 (1,086) ; 6c ;
Smoky light brown with orange crust where left ; 7·1 × 5·1 × 2·3.
Roughly flaked rectangular axe with double transversal re-edging applied on one end from the two faces. The cutting edge shows very fine battering by use. The opposite end is only crudely prepared. Owing to the natural shape of the original nodule, the lateral edges of the axe have a somewhat zigzag outline (compare side view).

Plate LXIII △

23 ; I D4 ; 6d ;
Pale brown with buff cortex where left ; 7·4 × 5 × 2·4.
Flaked axe with transversal re-edging applied on its two narrow edges from the same face (left hand side view). The facets of this bevelling are not clear because they have been much battered by use. It is not possible to say, however, whether this implement has been used as a double axe or whether each of its cutting edges were used at a special stage in the history of the implement, though the latter alternative is more probable.

24 ; (= Φ 25) ; 1000 ; 7c (or 6c ?) ;
Very pale brown with buff cortex where left ; 8·2 × 4·5 × 2.
An adze (or axe) with its cutting end re-edged transversally from both faces. The cutting edge shows slight traces of utilization. The opposite end of the tool has been somewhat reduced in thickness (preparatory for hafting ?).

25 ; (= Φ 34) ; II G9 ; 7a ;
Light brown with buff cortex ; 5·4 × 3·3 × 1·6.
Finely worked rectangular adze. It is possible that it was prepared for use both ends. The end shown at the bottom of drawing may have been somewhat damaged through use. Part of the original cortex is left on both faces.

26 ; (= Φ 30) ; III H10 ; 7c ;
Greyish brown with buff cortex where left ; 5·9 × 3·3 × 1·6.
A relatively thin adze with transversal re-edging on one end from the two faces. The cutting edge shows very slight traces of battering.

27 ; (= Φ 33) ; I K10 ; 7c ;
Light brown with buff cortex where left ; 5·2 × 4 × 1·5.
Small and finely finished adze. Its working edge seems to have been bevelled or re-edged from both faces. This edge shows signs of battering and use. It also lies along the symmetrical axis of the tool.

28 ; (= Φ 35) ; I F3 ; 8 ;
Very light brown ; 8·5 × 3 ·4 × 1.
Re-edging flake which has been struck off the edge of an axe. The skill in striking off such a flake is shown by the great length of the flake and also by its relative thinness.

29 ; (= Φ 37) ; I J14 ; 8 ;
Dark brown ; 6·1 × 2 × 0·7.
A thin and fine specimen of a re-edging flake. On the left-hand side of the top view there are traces of a flat surface, but it is very doubtful whether this would indicate that the axe from which this flake has been struck was originally bevelled (that is, that it had another transversal flake struck off this edge) at an earlier stage.

30 ; III M14 ; 8 ;
Smoky light brown ; 6·8 × 3 × 1·4.
A relatively massive re-edging flake which has been struck off the edge of an axe. A previous effort to strike off such a flake was unsuccessful (compare flake scar to the right of the top view). In this case the flake struck proceeded only along half the length of the edge of the axe. The second effort, which removed the present specimen, was successful, though of course the amount by which the original axe was reduced in the process of transverse bevelling was almost double that which would have been incurred had the first effort been successful. (Note that the cross section to the right hand side does not actually represent the thickest part of the flake. Also on that section is represented in broken line the outline of the original axe.)

31 ; (= Φ 26) ; III O12 ; 5 ;
Very dark grey ; 3·5 × 3·7 (long diameter of cross section) × 2·4.
Fragment of a ground and polished axe or celt of porphyrite. The polishing is not very well finished, and the tool is not quite symmetrical in cross section. It seems to have been rather long and to have had fairly straight lateral edges. Its cutting edge is somewhat battered. This is the only specimen of its kind found in the settlement.

Diagram 1 ; Showing section outlines of adzes and axes. (See Section iv of text.)

Plate LXIV

32 ; (= Φ 38) ; I K11 ; (1023) ; 9a ;
Smoky light brown with buff cortex ; 12·4 × 6·7 × 2·5.
Dibble or digging pick made from a flat nodule. The pointed neck is carefully worked by primary and secondary retouch. It has a double-convex cross section. The tip is not sharpened by means of bevelling. The butt end is left intact.

33 ; 1,000 ; 9c ;
Smoky light brown ; 4·5 × 2·1 × 1·4.
Broken neck and tip of a dibble. The tip was bevelled transversally on one face only (shown by arrow on left hand side view). It shows some traces of battering.

34 ; (= Φ 39) ; I M13 (1075) ; 9b ;
Light brown with buff cortex where left ; 10 × 6·3 × 2·3.
Dibble or digging-pick made from fragment of nodule. The working neck is short but carefully prepared by means of primary and secondary retouch. The tip has been bevelled or sharpened (probably in two stages ?) by means of a longitudinal "*coup de burin*" (shown by arrow on left hand side view). The result is, that at the tip the neck has a plano-convex cross section. The thickness of the butt end is reduced by the removal of the cortex from one face (perhaps by a natural fracture) and by means of crude sloping chipping on the other (shown in corresponding photograph of the tool).

35 ; (= Φ 40) ; Cultivation ; 9d ;
Light brown with buff cortex where left ; 13·6 × 9·5 × 3·4. Finely finished dibble with relatively long neck. Its tip has been re-edged or sharpened from both sides. The left hand side view shows a fine facet of a longitudinal bevelling (indicated by arrow), while the right hand side view shows one which appears to have been more or less transversal (also indicated by arrow). Although showing a little battering by use, the tip is sharp (see side view).

36 ; Cultivation ; 9d ;
Dark brown with buff cortex ; 12·4 × 5·6 × 3·7.
Dibble or digging pick made from a flint nodule. It has a finely finished though relatively thick neck. Its tip has been pointed by means of a transversal "*coup de burin*" on one face, and two longitudinal ones on the other (indicated by arrows). The butt end is left intact.

37 ; (= Φ 42) ; Cultivation ; 9b ;
Very light brown with buff cortex ; 12·2 × 4·8 × 4·6.
A very crude dibble or pick made from a nodule which has been roughly shaped into a prism. The tool has a triangular cross section both on the neck and on the main body of the nodule. The tip seems to have been bevelled or sharpened by a longitudinal "*coup de burin*" (shown by arrow). This unique specimen resembles the so-called "Chalossian" "*coup de poing*" (Lower Palæolithic) on the one hand, and the historic pick (Dynastic) on the other.

Plate LXV △

38 ; (= Φ 44) ; Cultivation ; 10a ;
Light brown ; 6·4 × 3 × 0·9.
A unique specimen of a chisel with squared working edge and a tang (for hafting). It is neatly worked all over from both faces. Its working edge has been thinned by longitudinal flaking from both faces (compare side view) and shows little traces of battering. The tang is thick and rather clumsy.

39 II O11 ; 10b3 ; (or 11a) ;
Light brown with orange crust where left ; 4·4 × 4·3 × 1·2.
A rectangular chisel-ended tool which may have also been used as a rectangular bifacial plane. On one face (left hand side) it is worked steeply on three edges and less deeply on the fourth (top), though part of the original crust is left in the middle. Most of the other face is flaked over but only one edge (the top one in this case) is worked steeply (compare section). It is almost impossible to decide which was the working edge. More than one may have been used at one time or another.

40 ; II O14 ; 11a ;
Light brown with grey buff crust where left ; 6·2 × 5·5 × 1·5.
Largely bifacial plane. The upper face (left hand side view) is worked by large primary flaking supplemented by finer secondary flaking on edges. The flaking is fairly steep. The upper end (top of drawing) is rounded, while the working edge (bottom of drawing) is gently curved. The lower face of the implement is flaked over the greater part though it still retains part of the original natural surface. The flaking on this face is very flat. The implement has a fairly symmetrical plano-convex section (both longitudinally and transversally).

41 ; (= Φ 46) ; III K14 ; 11a ;
Reddish brown (veined) with chocolate natural surface where left ; 4·5 × 5·2 (breadth) × 1·1.
Largely bifacial triangular plane. It is worked on tabular flint with traces of the original natural surface left on both faces. The narrow end is broken, but seems to have been pointed. The working end (bottom of drawings) is very steeply trimmed from one face (the upper face, left hand side view) and exhibits only very little work on the other. The two converging edges of the implement are flaked symmetrically on both faces. The flaking on them is sloping and not steep.

42 ; (= Φ 45) ; I J13 ; 11a ;
Greyish brown ; 6·3 × 4·8 × 1·1.
Triangular bifacial plane (with narrow end broken). Its broad working edge (bottom of drawings) is rather battered. Its cross section was originally plano-convex.

43 ; III M10 ; 11b ;
Pale buff ; 5·8 × 5·1 × 1·2.
Largely unifacial plane made of sheet of tabular flint. The upper face (left hand side view) is trimmed steeply on the edges leaving part of original cortex in the middle. The lower face is, on the other hand, left intact, except for slight flaking on one of its lateral edges (perhaps extended to the broken narrow end which may have been prepared for hafting ?). The working edge of the tool (bottom of drawings) is somewhat battered.

44 ; (= Φ 52) ; II C2 ; 11b ;
Tinted light brown ; 6·8 × 5·8 × 1.
A relatively fine specimen of a unifacial plane made from a flake struck off a sheet of tabular flint (there is no trace of the bulb on the specimen, however). The upper face (left-hand side view) has its edges steeply trimmed all round but retains part of the original natural surface. The top end is rounded and the broader (working) one is squared rather irregularly. The lower face of the tool is left intact.

45 ; (=Φ 53) ; I M8 ; 11b ;
Smoky light brown with purple crust ; 6·6 × 4·8 × 0·6.
Triangular unifacial plane made of a sheet of tabular flint. Its edges are trimmed steeply from one face only and the crust is left on both faces. The narrower end is not broken but has an old natural fracture. The broad working edge is but little battered.

46 ; III M9 ; 11b ;
Greyish brown with buff cortex where left ; 5·8 × 3·5 × 0·8.
Unifacial plane made of a natural flake of tabular flint. The edges of the upper face (left hand side view) have been trimmed all round, leaving part of the original cortex. The top end is somewhat rounded (instead of pointed), while the working end is squared. This latter end is partly damaged. The lower face (right hand side view) is left flat. (The faceting on the top end of the drawing is a natural fracture.) The implement has an almost perfectly plano-convex section.

Plate LXVI

47 ; (= Φ 63) ; 1,100 ; 12a ;
Greyish brown with buff cortex ; 4·2 × 3·6 × 2·6.
A high thick core-scraper. It has a flat under surface (right hand side view) and a domed outline (middle view). It is not clear whether it was used first as a core and then adapted into a scraper or whether it was originally fashioned as a scraper.

48 ; (= Φ 59) ; I J10 ; 12e ;
Very light brown with buff cortex ; 6·6 × 4·8 × 1·7.
Relatively thick scraper of the keel type. The flaking and trimming on its working end (top) is fairly steep and resembles fluting.

49 ; (= Φ 65) ; 1,000 ; 12b ;
Reddish with buff cortex where left ; 7·9 × 8·1 (breadth) × 1·2.
A large scraper or "*racloir*" made from a sheet of tabular flint. One edge of it is thinned out into a scraper (bottom of left hand side view). The other edge (opposite) is apparently prepared for hafting. The right hand side view is mostly that of a natural fracture.

50 ; I O7 ; 12c 1 ;
Greyish brown and grey (patchy) with buff cortex where left ; 5 × 3·6 × 1·2.
An irregular (twisted) side-and-end scraper. It is trimmed nearly all round except at butt end (where the cortex is retained). Its working edges are rather thick.

51 ; II L10 ; 12c 1 ;
Patchy grey and brown ; 4·5 × 2·9 × 1·5.
Short and more or less ovate side-and-end scraper. It is thick in the middle, but its butt end has been reduced in thickness from upper face (compare section). The striking platform, as usual on all these scrapers on struck flakes, is simple.

52 ; I G11 ; 12c 2 ;
Very light brown ; 5·9 × 6·9 (breadth) × 1·3.
A more or less round scraper. It is trimmed on most of its round border. The working edge is thin. The flake has a pronounced bulb.

53 ; III M11 ; 12c 2 ;
Pale brown ; 5·6 × 3·8 × 0·9.
Medium sized ovate shaped side-and-end scraper. Its working edge is also of medium thickness at tip end, and rather thin on sides. The striking platform of the flake may be regarded as simple, though it actually has two facets.

54 ; (= Φ 67) ; II J10 ; 12c 2 ;
Greyish brown with buff cortex where left ; 5·6 × 3·4 × 0·7.
Thin, somewhat ovate side-and-end scraper. Its working edge is thin and the secondary trimming on it is of the sloping type (not steep). The flake retains part of original cortex.

55 ; I N9 ; 12c 2 ;
Very light chocolate ; 4·9 × 3·8 × 0·7.
Small ovate shaped side-and-end scraper made of a regular and thin flake. It is trimmed nearly all round. The trimmed edges are thin.

56 ; I M12 ; 12c2 (and 12f) ;
Grey brown ; 5 × 3·4 × 1·2.
A relatively small side-and-end scraper. Apart from fine working applied on its edges, especially the tip, from the upper face (left hand side view), it also has a notch made by inverse trimming on the flat face (right hand side view). This little notch may have been used as a small hollow scraper.

57 ; III S14 ; 12f ;
Very pale brown with buff cortex where left ; 6 × 5·2 × 1·8.
Double hollow scraper notched alternately : i.e., one notch made on upper face (inner side of right hand view), and the other from the lower face (outer side of the left hand view). This forms a cross section of longitudinal shape between the two notches. Part of the original white cortex (very thin) remains on one face (right hand side view). The bottom end of the implement seems to have been very crudely prepared, either for holding (in hand ?) or for hafting.

Plate LXVII △

58 ; 1,000 ; 14a ;
Brownish grey ; 5·9 × 3·1 × 0·9.
Rectangular bifacial tool which may have served as a bifacial sickle. It is fairly well worked all over, and has a more or less symmetrical cross section. Its transversal ends are squared and bevelled by means of sloping trimming from alternate faces : i.e., the bottom end worked on face shown in left hand side view, and the top one on the right hand one (compare side view). It is possible that this specimen constituted the middle piece of a three piece bifacial sickle : i.e., that chisel-ended and pointed sickles were joined to it at either end. There is also the possibility, however, that this tool was broken accidentally on its upper transversal end and then retouched.

59 ; (= Φ 80) ; I L11 ; 14a ;
Light grey ; 6·5 × 3·8 × 0·9.
Fragment of bifacial sickle which has been further damaged by fire. The sickle appears to have been either of a triangular or of a double-pointed type. It has teeth on one edge only, but its cross section was almost perfectly symmetrical (before destruction by fire). There are no indications on the specimen, however, that it was polished or even ground to that symmetrical form and then re-flaked. The serrated edge appears to retain very faint traces of gloss in spite of the effect of fire.

60 ; (= Φ 83) ; Cultivation ; 14a ;
Smoky brown with greyish patch ; 14·4 × 3·2 × 0·8.
A fine specimen of a double pointed bifacial sickle. The serrated edge is relatively straight while the unserrated one is slightly curved. Also in cross section, the serrated edge is somewhat thicker than the unserrated one. There is no evidence that the tool was ground to shape before it was pressure-flaked. It should also be noted that both the serrated and the unserrated edges show gloss, caused by cutting silica-bearing grass. They were, therefore, both used for the same purpose. This may reflect on the method in which the tool was hafted (perhaps it was hafted from one of the narrow ends ?).

61 ; (= Φ 88) ; 1,000 ; 14a ;
Dark grey ; 5·6 × 3·2 × 0·9.
Broken fragment of finely finished bifacial sickle. It is serrated only on one edge and has a moderately symmetrical cross section. The denticulated edge shows fairly clear signs of having been ground to shape before being serrated. This is the only specimen of the collection that shows such a feature. No gloss is shown on either edge.

62 ; II J14 ; 14b 2 ;
Greyish brown ; 6·9 × 1·9 × 0·6.
Special type of blade-sickle with very little lateral trimming, but with marked traces of utilization on the two edges. The broad end (in this case the one originally nearer the bulb which has been removed) is squared, or truncated by steep trimming from the upper face. The narrow end is somewhat rounded and has traces of cortex still left on it.

63 ; (= Φ 97) ; I G14 ; 14b 3 ;
Dark grey with buff crust where left ; 5·5 × 2 × 0·7.
Fragment of a blade-sickle. The working edge is prepared from the upper face (the traces of inverse work shown on the lower part of the inner edge of the face drawn on the right hand side are accidental). This edge also shows very slight traces of gloss caused by cutting silica-bearing grass. The other edge (outer side of drawings) is worked inversely (i.e., on the flat face), presumably as a preparation for hafting. Part of the original crust (very thin) is left on the upper face (left hand side view).

64 ; (= Φ 102) ; 1,100 ; 14b 4 ;
Light brown ; 9·9 × 2·4 × 0·6.
Fine specimen of a blade-sickle. Its bottom transversal end is squared by trimming on the upper face, while the broken tip was probably pointed. The serrated edge is worked almost entirely from the flat face (inverse trimming) ; and it shows friction gloss. The other edge is largely trimmed on the upper face with very slight work on the flat one. This edge shows no gloss and was probably hafted.

65 ; III M9 ; 14b 4 ;
Grey ; 3·1 × 2·2 × 0·5.
Broken fragment of blade-sickle. The working edge is trimmed inversely (i.e., from flat face). The other edge seems to have been either left intact or very slightly touched.

66 ; I E4 ; 14b 7 ;
Very dark grey ; 5·7 × 1·8 × 0·5.
Broken fragment of blade-sickle. The working edge was serrated from both faces. The other edge was largely left intact, except for slight retouch shown at top of left hand side view. The specimen exhibits very slight traces of gloss on the working edge.

67 ; (= Φ 96) ; I M10 ; 14b 9 ;
Light brown ; 3·9 × 1·1 × 0·4.
Rectangular blade-sickle, with steep backing. The serration on the working lateral edge is produced by notches from both faces (though mainly from the upper one). The two narrow ends are squared ; one by trimming on the upper face and the other by trimming on the lower, flat one. It is possible that the latter end was accidentally broken and then retouched inversely. As the implement has a steep back, its cross section is an elongated triangle. That the implement has been much utilized is shown by the gloss on the working edge and the somewhat smoothed condition of the teeth.

68 ; II L8 ; 15a ;
Very light brown ; 7·8 × 2·3 × 0·6.
Simple blade (broken one end) with very little traces of trimming on one edge (inner edge of the left hand side view). The other edge shows slight traces of utilization.

69 ; (= Φ 109) ; 1,100 ; 15a ;
Very light greyish brown ; 6 × 2·3 × 0·7.
A broken fragment of a simple blade-knife, with traces of utilization but no trimming on its lateral edges. The specimen illustrates the longitudinal type of preparation of the striking platform. Small longitudinal flakes have been struck off the butt-end before the present specimen was struck off (left hand side view). This led to the thinning of the bulbar end (compare side view) and so the pressure produced by the main "*blow*" was allowed to travel longer along the main axis of the blade (when it was still on the parent core), instead of being diffused laterally. The result is that the blade obtained is a long one.

70 ; (= Φ 111) ; I R14 ; 15b ;
Dark grey ; 5·5 × 2 × 0·4.
Fragment of a simple blade with its tip trimmed in a gentle curve on the upper face. The lateral edges of the tool show a slight trimming and traces of utilization. The specimen is slightly burnt.

71 ; (= Φ 112) ; I L10 ; 15c ;
Grey with light brown patches ; 7·2 × 3·3 × 0·8.
Blade-knife with no retouching but with definite traces of utilization on its lateral edges. The tip has also been trimmed off from the flat face.

72 ; II N13 ; 15e ;
Brownish grey ; 4·9 × 2·2 × 0·8.
Blade-knife with inverse retouch along one edge (inner edge of right hand side view), and traces of utilization along the other. The tip has been trimmed fairly steeply on the upper face. It is to be noted that a few minor flakes ("*éclats de préparation*") have been struck off the bulbar end of the upper face of the flake, preparatory to striking off this latter (see description of specimen △ 69, above).

73 ; (= Φ 110) ; I E6 ; 15f ;
Smoky light brown with buff cortex where left ; 7·8 × 3·4 × 1.
Blade-knife with its tip truncated or trimmed obliquely on the upper face. The tip, however, still retains remains of the original cortex. The blade also shows very fine inverse trimming on both lateral edges.

Plate LXVIII

74 ; (= Φ 113) ; II O 14 ; 15d ;
Light brown ; 9·4 × 3·2 × 0·8.
Knife blade with lateral retouch on the two edges on the upper face. The tip end has been slightly broken and battered from both faces. The bulb remains and has a simple striking platform.

75 ; (= Φ 117) ; II J 9 ; 15i ;
Purplish light brown with buff cortex where left ; 6·1 × 2·6 × 0·6.
Scraping knife made of flake with plano-convex section. The flake is trimmed (fairly steeply) all round. It has a tang which is also prepared slightly on the inverse (flat) side. The tool is made of a naturally fractured flake of tabular flint. The original cortex is left on most of the upper face (left hand side view) and also slightly on the inverse side of the tang.

76 ; (= Φ 119) ; 1,000 ; 15i ;
Very light brown with buff cortex where left ; 9·6 × 3·3 × 1·5.
Scraping knife with sloping retouch on lateral edges as well as on rounded tip. There is an attempt at making a tang which is prepared on both faces. The implement has a plano-convex cross section.

77 ; II C2 ; 15i ;
Very light brown with buff cortex where left ; 5·4 × 3·6 × 1·1.
Broken tang fragment of a scraping knife (similar to previous specimen). The drawing shows the inverse face. The other face (not drawn) has lateral retouching along both edges.

78 ; (= Φ 127) ; 1,000 ; 15g ;
Smoky light brown ; 6·8 × 2·9 × 1·4.
Fragment of a thick blade-knife with alternate lateral trimming. The trimming, which is both primary and secondary, is fairly steep, but this may be due to the extraordinary thickness of the original blade.

79 ; II G8 ; 15g ;
Greyish brown ; 6·2 × 1·9 × 0·7.
Blade knife with alternate lateral retouch. The work on the edges is fairly steep, though it was probably intended to strengthen the edges for cutting and not to blunt them. The blade has a median ridge and a more or less triangular cross section. The narrow end (top of drawings) has a very flat bulb, but this has been partly removed by inverse flaking.

80 ; (= Φ 115) ; 1,100 ; 15j ;
Greyish brown ; 8·7 × 2·1 × 0·6.
A rectangular or double-squared blade-knife. Its two transverse ends have been squared by fairly steep trimming. It shows some trimming (on the upper face) along part of each of its lateral edges (left hand side view). There are also very slight traces of inverse trimming along part of one of the edges (right hand side view). This is a fine specimen of a blade-knife in spite of the fact that the cortex is left along part of one of the edges.

81 ; (= Φ 116) ; I M 10 ; 15j (or 14b2) ;
Greyish-brown ; 5·5 × 1·9 × 0·6.
Blade-knife with two squared ends (i.e., two transversal ends steeply trimmed in a square and slightly oblique way). One of the lateral edges is slightly retouched from the upper face, while the other is left intact. Though not serrated, the former edge shows slight but definite traces of friction gloss, and the tool may have therefore been used as a sawing knife or a blade-sickle.

82 ; II M8 ; 16c 1 ;
Smoky light brown ; 6.3 × 3·7 × 7·5.
A triangular point made of a struck flake. It has been roughly prepared all over its upper face (left hand side view), but only partly worked over its flat one. The bulb is still unremoved from this latter. It is evident that this tool could not have been used as an arrow-head in the strict sense. It was probably a javelin or spear point.

83 ; (= Φ 135) ; I M 13 ; 16c 2 ;
Light brown ; 6·8 × 2·6 × 0·9.
Bifacial tool of long triangular shape. It appears to have been a spear or javelin point. It is too thick to have served as an arrow-head. Also the broad bottom end is too clumsy for the tool to have been used as a chisel. On the other hand the tip shows a slight break, perhaps as a result of use. One of the lateral edges has also received two accidental breaks.

84 ; (= Φ 136) ; Cultivation ; 17 ;
Light grey ; 5·9 × 2·9 × 0·9.
An elongated triangular arrow-head. It is fairly well finished all over the two faces. Its broad base has been thinned by flaking, presumably in order to render it more suitable for hafting.

85 ; (= Φ 139) ; II D 2 ; 17 ;
Smoky light brown ; 4·2 × 3·1 × 0·6.
Fragment of a finely worked arrow-head with slightly concave base. The specimen is relatively thin, which may have been responsible for it having been broken across.

86 ; (= Φ 140) ; III M 11 ; 17 ;
Purplish grey ; 4·4 × 3·2 × 0·7.
Triangular arrow-head with a slightly concave base. Its tip has been broken. It is fairly well finished on both faces and has a more or less symmetrical cross section.

87 ; (= Φ 141) ; Cultivation ; 17 ;
Brownish grey ; 6·2 × 3·6 × 0·6.
A very fine specimen of a slightly hollow base arrow-head. It is carefully flaked on both faces and has a thin, though somewhat irregular cross-section.

88 ; IG 11 ; 18b (or 16b 2 ?) ;
Smoky light brown ; 4·6 × 1·7 × 0·8.
Borer point made of a narrow flake with steep trimming on both edges. The tip has also received very slight and shallow inverse flaking. The butt-end, on the other hand, received no secondary preparation. The implement can have been used either as a borer or as a point. As usual, the striking platform of the flake is simple.

PLATE LXIX

89 ; (= Φ 154) ; III M 11 ; 19a ;
Greyish brown ; 6·8 × 2·2 × 0·7.
Burin of the " *bec de flute* " type. It is made of an ordinary flake which had one of its lateral edges slightly trimmed prior to the making of the burin (inner edge of right hand side full view). Two " *coups de burin* " were given from two opposite directions on the tip (shown by arrows on drawings). The beak of the implement shows fairly definite traces of utilization on both sides.

90 : (= Φ 155) ; I D 5 ; 19a ;
Light brown and grey (patchy) ; 5·8 × 2·3 × 0·9.
Burin of the " *bec de flute* " type made of an ordinary flake. One of the lateral edges of the flake had received very slight traces of trimming before the making of the burin (inner edge of full view). The flake seems also to have been truncated obliquely (between C and D on left hand side partial view) and the truncated line retouched steeply before the main " *coup de burin* " was given (from the direction of C on the left hand side view) along part of the same truncation. Altogether two " *coups de burin* " were given (indicated on the drawings by arrows), but one of them has been battered by use (inner edge of the tip of the right hand side full view). The angle between the two slopes of the beak (facets) is about 60°. It is also probable that the tool may have been first an angle burin with an obliquely truncated end before it was converted into a proper " *bec de flute.*"

91 ; (= Φ 153) ; II R 12 ; 19b 1 ;
Greyish brown ; 4·6 × 2·4 × 0·8.
An angle burin made of the fragment of a long blade. It is steeply trimmed on one of its lateral edges and on its squared top end. The " *coup de burin* " given on the tip of one of its lateral edges is shown by the arrows on the drawings (it is clearly brought out on the middle view.)

92 ; (= Φ 152) ; 1,100 ; 19b 2 ;
Very light brown with buff cortex where left ; 5·3 × 3·0 × 1·1.
Angle burin with its retouched edge curved round. It received two distinct " *coups de burin* " at two different stages. After the one, the working section of whose facet is shown by the broken arrow, had been worn out, the tool was " renewed " by a second " *coup de burin,*" which gave it a new cutting edge (shown by the solid arrow). Even the new face may have been produced by two " *coups.*" It shows traces of utilization and wear. The implement may have been used as a combined burin and scraper.

93 ; (= Φ 151) ; 1,000 ; 19b 3 ; (and 19a) ;
Very light brown ; 6·7 × 4·1 × 1·7.
A clumsy specimen of a multiple burin. At the top right hand corner of the right hand side view two " *coups de burin* " make an angle burin whose retouched transversal edge is slightly concave. The pointed bottom of the tool is rather battered (by use ?) ; but it shows what seems to be two " *coups de burin* " given from two different sides (shown by solid arrow when visible on drawing, and by broken one when not visible) which seems to make up a thick " *bec de flute.*"

94 ; (= Φ 150) ; III O 13 ; 19c ;
Greyish brown with buff cortex where left ; 5·8 × 3·1 × 0·9.
Unique specimen of an oblique " transversal burin." The flake removed by the " *coup de burin* " runs in an oblique transversal direction across the tip of the blade. Prior to its being removed, the top part of one of the lateral edges was prepared by trimming on its upper face. It is also interesting to note that the tip of the tool, which is the working end, was strengthened by a very slight retouch (or blunting) on the inverse (flat) face. The tip shows slight traces of utilisation.

Note on Distribution of Material.

All the specimens illustrated on the plates have been given to the University Museum, Manchester. So has all the material that has come from the three Levels of Area 1000. As to the rest (non-illustrated) of the material registered as 1000 (mostly surface of that Area), Cultivation, or 1100, it has been divided in equal shares between the Mat-haf al Djami'ah al-Misriyah (Egyptian University Museum, Cairo), and the British Museum, London. This makes the final distribution between the three Museums, as follows (with the number of specimens between brackets) :

Manchester : Level I (275) ; Level II (115) ; Level III (67) ; 1000 (23) ; Cultivation (12) ; and 1100 (16).
Cairo (Egyptian University) : 1000 (36) ; Cultivation (10) ; and 1100 (21).
London (British Museum) : 1000 (37) ; Cultivation (10) ; and 1100 (19) (for number see p. 188).

Note on Terminology.

The terminology used by prehistorians is still in great confusion. Until some kind of general agreement has been reached on the exact connotation of such terms as Chalcolithic,

Predynastic, etc., the use of these terms must remain loose, and largely arbitrary. In spite of certain difficulties which need not be discussed here, the term Chalcolithic has been used here to cover the post-Neolithic phase when metal was coming into use, but when the industry was still a stone one in all its essentials. In other words, it includes the phase from the beginning of the Badarian stage to the beginnings of the historic (Dynastic) phase proper. In many places the term " post-Neolithic " has been used instead of Chalcolithic. As to the term Predynastic, it has been used to cover the three classical stages of Amratian, Gerzean and Semainian. In other parts of this book, however, the Early Predynastic stage is extended before the Amratian. In order to avoid confusion, therefore, we have always added the word Amratian or the figure (IV) after the term Early Predynastic whenever it has been used. And finally the transliteration of the various place-names has been rendered, whenever possible, in the nearest form to the original pronunciation, though here, too, the most current form of spelling has been added, between brackets, at the time when the name was mentioned for the first time. As in certain cases (such as that of Marmadat Bani Salamah or Merimde Benisalâme), however, a strictly Egyptian variety of Arabic, the current forms (Merimde and Merimdian) have been maincorrect transliteration may actually be misleading to readers who are not acquainted with the tained. It is clear, however, that until the time has come when standardised forms of transliteration are accepted by writers in various foreign languages, the particular forms adopted must remain largely a matter of expediency and convention.

References mentioned in Text.

This is not a bibliography. Only works mentioned in the text are given here. In the footnotes only the name of author and the year of publication are given. A key may be found in the following list :

Amer, M. (1932).
See O. Menghin & M. Amer . . . (1932).

Amer, M. (1932a).
Al-Ma 'adi qabl al-Tareekh, al-Qahirah, 1932 (in Arabic, 16 pp.).

Amer, M. (1933).
" Two Seasons Digging in the Prehistoric site at Ma'adi," *Bulletin of the Faculty of Arts*, Cairo, vol. I., Part I., 1933, pp. 140-3.

Baumgärtel, E. and Brotzen, F. (1927).
" Steinzeitliches Material aus den südlichen Mittelmeerländern im Museum für Völkerkunde, Berlin," *Praehist. Zeitschr.* Bd. XVIII., 1927, S. 91-111.

Baumgärtel, E. (1928).
" Neolithische Steingeräte in Form von Typen des älteren Pälaolithikums," *Praehist. Zeitschr.* Bd. XIX., Heft 3/4, 1928, S.101-9.

Breuil, H. (1931).
" L'Afrique prêhistorique," *Cahiers d'Art*, Paris, 1931.

Brunton, G. & Caton-Thompson, G. (1928).
The Badarian Civilization and Predynastic Remains near Badari, London, 1928.
Part I : " The Badarian Civilisation," by G. Brunton.
Part II : " The Predynastic Settlement : North Spur Hemamieh," by G. Caton Thompson.

Brunton, G. (1929).
" The Beginnings of Egyptian Civilisation," *Antiquity*, vol. III., No. 12, Dec. 1929, pp. 456-67 (illust.).

Caton-Thompson, G. (1928).
See G. Brunton & . . . . . (1928)

Caton-Thompson, G. (1928a).
" Neolithic Fayum Pottery," *Ancient Egypt*, 1928, Sept. Part III., pp. 70-89.

Caton-Thompson, G. and Gardner, E. W. (1929).
" Recent Work on the Problem of Lake Moeris," *Geog. Journ.* vol. LXXIII., No. 1, 1929, pp. 20-60.

Caton-Thompson, G. (1931).
" The Royal Anthropological Institute's Prehistoric Research Expedition to Kharge Oasis, Egypt. Preliminary Outline of the Season's Work," *Man*, 1931, No. 91, pp. 77-84.

Caton-Thompson, G., & Gardner, E. W. (1934).
The Desert Fayum (2 vols. ; one text and one plates), pub. by Roy. Anthr. Inst., London, 1934.

Gabra, S. (1930).
" Fouilles du Service des Antiquités à Deir Tassa," *Ann. Serv. Antiq. Eg.* t. XXX., Le Caire, 1930, pp. 147-158.

Garstang, J. (1903).
Mahâsna & Bêt Khallâf, Egyptian Research Account, 1901, 7th Year, London, 1903.

Junker, H. (1928).
" Bericht über die von der Akademie der Wissenschaften in Wien nach dem Westdelta entsendete Expedition (20 Dez., 1927, bis 25 Feb., 1928) " *Denkschr. Ak. Wiss. Wien, Phil.-hist. Kl.*, Bd. 68, Abh. 3, Wien, 1928.

Junker, H. (1929).
" Vorläufiger Bericht über die Grabung der Akademie der Wissenschaften in Wien auf der neolithischen Siedlung von Merimde-Benisalâme (Westdelta), vom 1 bis 30 Marz, 1929," *Anz. phil.-hist. Kl. Ak. Wiss. Wien*, Jahrg. 1929, Nr. XVI-XVIII., S. 156-248.

Junker, H. (1930).
" Vorläufiger Bericht über die zweite Grabung der Akademie der Wissenschaften in Wien auf der vorgeschichtlichen Siedlung Merimde-Benisalâme, vom 7 Feb. bis 8 April, 1930," *Anz. phil.-hist. Kl. Ak. Wiss. Wien*, Jahrg. 1930, Nr. V-XIII., S. 21-82 (with " Preliminary Note on Human Remains from a Neolithic Settlement at Merimde-Benisalâme," by D. E. Derry, pp. 53-60).

Junker, H. (1932).
" Vorbericht über die dritte, von der Akademie der Wissenschaften in Wien in Verbindung mit dem Egyptiska Museet in Stockholm unternommene Grabung auf der neolithischen Siedlung von Merimde-Benisalâme," Sonderabdruck aus dem *Anz. phil.-hist. Kl. Ak. Wiss. Wien*, Jahrg. 1932, Nr. I.-IV., S. 36-82.

Junker, H. (1933).
" Vorläufiger Bericht über die von der Akademie der Wissenschaften in Wien in Verbindung mit dem Egyptiska Museet in Stockholm unternommene Grabung auf der neolithischen Siedlung von Merimde-Benisalâme, vom, 2 Jan. bis 20 Feb., 1933 " *Anz. phil.-hist. Kl. Ak. Wiss. Wien*, Jahrg., 1933, Nr. XVI.-XXVII., S. 54-82.

Menghin, O. and Amer, M. (1932).
" *The Excavations of the Egyptian University in the Neolithic Site at Ma'adi, First Preliminary Report* (*Season* 1930-31)," Egyptian University, Faculty of Arts, Pub. No. 19, Cairo, 1932.

Menghin, O. (1932a).
" The Stone Age of North Africa with special reference to Egypt," *Bull. Soc. Roy. Géog. d'Egypte*, t. XVIII. Le Caire, 1932, pp. 9-27.

Menghin, O. (1932b).
" Die Primitivetypen des Neolithikums von Merimde-Benisalâme," *Anz. phil.-hist. Kl. Ak. Wiss. Wien*, Jahrg. 1932, Nr. I.-IV., S. 83-88.

Menghin, O. (1932c).
" Die Grabung der Universität Kairo bei Ma'adi." *Mitt. Deutsch. Inst. Aegypt. Altkde Kairo*, Bd. II. H. 2, Wien, 1932, S. 143-7.

Menghin, O. (1932d).
" Die Grabung der Universität Kairo bei Ma'adi (Zweites Grabungsjahr)," *Mitt. Deutsch. Inst. Aegypt. Altkde Kairo*, Bd. III., H. 2, Wien, 1932, S. 150-4.

Menghin, O. (1934).
" Die Grabung der Universität Kairo bei Ma'adi (Drittes Grabungsjahr)," *Mitt. Deutsch. Inst. Aegypt. Altkde Kairo*, Bd. V., H. 2, Wien, 1934, S. 111-118.

Morgan, J. de (1896) et (1987).
Recherches sur les origines de l'Egypte, 2 tomes, Paris, 1896-7.
t. I : " L'âge de la pierre et les metaux," 1896.
t. II : " Ethnographie préhistorique et Tombeau royal de Négadah," (avec la collaboration de Wiedemann, G. Jequier et Fouquet), 1897.

Neuville, R. (1931).
" L'Industrie lithique de Teleilat Ghassoul," *Bull. Soc. Anthr., Paris*, 1931, Extrait 12 pp. et 9 pl.

Neuville, R. (1933).
" Notes de préhistoire syro-palestinien," *Journ. Palest. Orient. Soc.*, vol. XIII., 1933, pp. 128-136.

Peet, T. E. (1914).
The Cemeteries of Abydos. Part II.-1911-1912 ; London (The Egypt Exploration Fund, 34th Memoir), 1914.

Petrie, W. M. Flinders, and Quibell, J. E. (1896).
Naqada & Ballas 1895, (with chapter on the Flint Implements of Naqada, by F. C. J. Spurrell), London 1896.

Petrie, W. M. Flinders (1901).
Diospolis Parva ; the Cemeteries of Abadiyeh & Hu, 1898-9, The Egypt Exploration Fund, London, 1901.

Petrie, W. M. Flinders (1915).
" The Stone Age in Egypt," *Anc. Egypt*, 1915, pp. 59-77 & 122-135.

Petrie, W. M. Flinders (1917).
Tools and Weapons, London 1917.

Petrie, W. M. Flinders (1920).
Prehistoric Egypt, London 1920.

Quibell, J. E. (1900).
Hierakonpolis, Part I., Plates discovered by J. E. Quibell, with notes by W. M. Flinders Petrie, London, 1900.

Reisner, G. A. (1910).
The Archæological Survey of Nubia : Report for 1907-08 : I. Archæological Report, Cairo 1910.

Vignard, Ed. (1921).
" Une station Aurignacienne à Naq-Hamadi (Haute Egypte) ; Station du Champ de Bagasse," *Bull. Inst. franç. d'Arch. or.*, t. XVIII., fasc. 1 (1920), Le Caire, 1921, pp. 1-20.

Vignard, Ed. (1929).
" Station Aurignacienne du Champ de Bagasse à Naq-Hamadi (Haute-Egypte)." *Bull. Soc. Prehist. franç.* t. XXVI., 1929, pp. 299-306.

Vignard, Ed. (1934).
Les Microburins Tardenoisiens du Sébilien. Fabrication.—Emplois. Origine du Microburin, Extrait du Congrès Préhistorique de France, X^e^ Session, 1934, pp. 66-106.

S. A. H.

CHAPTER XV

THE OSTEOLOGY

REPORT ON THE ANIMAL REMAINS.

BY J. WILFRID JACKSON, D.Sc., F.G.S.

INTRODUCTION.

WHILE examining the remains of sacred cattle from the Bucheum and Baqaria in the winter of 1931–32, I had the opportunity of studying some fragmentary animal remains obtained by Mr. O. H. Myers from kitchen-middens during excavations of a Predynastic settlement near Armant in a previous season. The bones and teeth were in three groups, coming from Layers I, II, and III, respectively. They belong to ox, sheep, pig, dog ?, turtle, crocodile, and fish, and represent the food-debris of the ancient inhabitants of the Nile Valley.

DESCRIPTION OF THE SPECIMENS

Ox. Numerous remains of oxen occurred in all three layers. Those examined consist of broken limb-bones with fragments of skulls and jaws, but no horn-cores are present. In addition to the marrow-containing bones, the metacarpals and metatarsals have also been split or broken across. Several animals are represented. The following dimensions may be useful for future comparison. Four astragali measure 65 mm. (3 ex.) and 70 mm. (1 ex.) over all. Three calcanea are 129 mm. (2 ex.) and 140 mm. (1 ex.). The distal ends of three metacarpals measure 56, 64, and 66 mm. in width. There appears to be little difference in size between the bones from this settlement and those of sacred cattle from the very much later Baqaria.[1]

Sheep. The remains of sheep are fragmentary and not very numerous. They comprise broken limb-bones, lower jaws, teeth, and bits of horn-cores, and were found in all three layers. A metatarsal from Layer II is long and slender. Its imperfect condition prevents the length being ascertained, but the mid-shaft diameter is 12·5 mm., and the condyles measure 25 mm. It closely resembles Romano-British examples from English sites. The distal end of a metacarpal from Layer I is "waisted" near the condyles, as in Romano-British examples. Two astragali from Layer I measure 29 and 32 mm. in over-all length, and one from Layer II measures 28·5 mm. Two calcanea from Layer I are 54 and 63 mm. long: the widths of the distal ends of two tibiæ from the same layer are 28 and 29 mm., and those of two humeri are 31 and 34 mm. In a right lower jaw fragment from Layer I the length of the tooth-row is about 73 mm.

[1] See *The Bucheum*, 1934, Chap. XVII, "The Osteology," pp. 137–142, and Pl. XCVII.

Pig. Some remains of pig were found in Layers I and II. They include distal ends of humeri, a calcaneum, a few teeth, and two fragments of upper jaw with teeth. The last molar is small and measures 23 × 17 mm.

Dog ?. From Layer I is a calcaneum measuring 50 mm. in length. This was the only canine bone found on the site.

Turtle. Two plates, one from Layer II and one from Layer III, belong to turtle.

Crocodile. Two plates from Layer III are those of crocodile.

Fish. A small fragment of a fin-spine was met with in Layer II.

REMARKS.

The remains described above provide evidence of the animals living in Ancient Egypt and used for food by the Predynastic dwellers of the Nile Valley. The presence of the ox, sheep and pig seems to indicate that the people were in possession of domesticated animals, and perhaps kept milch kine. The remains, unfortunately, are too few and fragmentary to assist in ascertaining anything with regard to breed.

Remains of various animals were found by J. de Morgan among the Predynastic kitchen-midden debris at Toukh, near Negadah, Upper Egypt. These included the bones of the dog, ox, goat, sheep, and pig, together with those of buffalo and other wild animals, birds, turtles, fishes and molluscs.[1]

At Badari, near Qau, in Upper Egypt, evidence was found of the burial of certain animals by the Badarians. These included the dog or jackal, the sheep or goat, and oxen. All were wrapped in matting. The crushed skull of a large bovine from one of the graves was identified by Professor Watson as a remarkably big-horned animal and he was not certain that it may not be that of a cow-buffalo.[2] At Badari, also, in later deposits, were found the remains of ox, sheep or goat, and pig. These occurred in the Upper Early Predynastic and Lower Middle Predynastic levels.[3] An example of White cross-lined pottery from this site shows figures of a bovine.[4]

Other remains of domestic animals of Predynastic date have been found in Lower Egypt. In the excavations of the Egyptian University in the Neolithic site at Maadi, south of Cairo, a considerable number of bones of oxen, sheep, goat and pig were obtained. The remains of the ass, turtles, fishes, and freshwater shells were also found, as well as the bones of a large rodent which may be a beaver. From the excavations of the earlier Neolithic station of Merimde-Benisalâme, in the Delta, the remains of oxen, sheep and pigs (possibly also goat) have been recorded, and in addition bones of the same large rodent as at Maadi.[5]

It is to be noted that the remains of the domestic ass occurred at Maadi,[6] but not at Armant, Toukh, Badari, or Merimde-Benisalâme. The absence of its bones from the food-refuse heaps

[1] J. de Morgan, *Récherches sur les origines de l'Egypte*, II, 1897, p. 99.

[2] See A. G. Brunton and G. Caton-Thompson, *The Badarian Civilisation*, 1928, p. 38.

[3] *Ibid.*, p. 77.

[4] *Ibid*, Pl. XXXVIII, C49K.

[5] O. Menghin and M. Amer, *First Preliminary Report* (Season 1930–31), Cairo 1932. (Egypt. Univ. Faculty of Arts. Publ. No. 19, p. 52).

[6] O. Menghin, in H. Junker, *Grabungen auf der neolithischen Siedlung von Merimde-Benisalâme.* Anzeiger d. phil.-hist. Klasse d. Akad. d.Wissen. in Wien, Jahr. 1933, pp. 88-89.

of the four last-mentioned stations may be due to the occupation being earlier, before the ass had been domesticated. On the other hand, unlike the ox, sheep and pig, the ass may have been in the possession of the early people and used as a beast of burden and not as an article of food; hence the absence of its bones. It is thought by some authorities that the ass was first tamed in Late Predynastic times by Libyans who had advanced to the western margin of the Delta, and, having obtained possession of domesticated sheep and goats, were inspired to tame the wild asses so abundant in the Libyan desert.[1] It may be remarked that the ass is figured with the ox and sheep on the celebrated Predynastic slate palette from Negadah in the Museum at Cairo.[2]

The ox shown on the above palette is interesting as being a long-horned species, and it may be related to the urus (*Bos primigenius*) : this is probably the oldest illustration of the ancient Egyptian domestic cattle. Bovine remains thought to belong to the urus or wild ox have been discovered in the Fayum Pleistocene deposits. These consist of a fragment of a frontal bone and a characteristic heel-bone.[3] They have been described by Hilzheimer as *Bos primigenius hahni*.

The study of early Egyptian oxen is beset with many difficulties, and very different opinions have been expressed regarding the interpretations of early figures on Egyptian antiquities. As an example of the confusion of ideas one might instance the Late Predynastic or Protodynastic carved slate from Abydos in the Louvre.[4] The wild bovine shown there attacking a man has been referred to the urus or wild ox (*Bos primigenius*) by Adametz[5]; to the Kaffir buffalo (*Bubalus caffer*) by Antonius[6]; and to the zebu (*Bos indicus*) by Stegmann.[7] The latter also sees the zebu in the bovines in the upper row on the Predynastic carved slate palette showing the domestic ass and domestic sheep in the Cairo Museum.[8] In my opinion, the elevated shoulders, due to the lowered heads, in these figures, in no way resemble the hump of the zebu, which is so well seen in the very much later, New Empire, figures. Owing to misinterpretation it has been thought by some writers that zebu-cattle were in Egypt in Predynastic times, and in explanation of their presence the view has been expressed that they were brought by invaders from Arabia to the old Ethiopia and spread from there over Africa and to Nubia and Egypt. The subject is too large to be discussed in this short report.

With regard to the domestic sheep, two distinct races were known to the Egyptians. These have been referred to *Ovis longipes* Fitz, race *palaeoaegypticus* D. & G., and *Ovis platyura* Wagner race *aegyptica* Fitz. The first-named sheep is the oldest and was the " Ram of Mendes." It seems to have existed from very early times in Egypt and was replaced later by the second form which was the " Ram of Ammon." The latter had horns curved in a semicircle and is known from the Twelfth Dynasty onwards. *Ovis longipes palaeoaegypticus* differs from the other sheep in having long horns directed horizontally outwards from the head and with a feeble spiral curve. Both sexes were horned and the ram usually had a mane. The type is known from very ancient

[1] See Peake and Fleure, *Corridors of Time*, III, 1927, pp. 78 *et seq.*
[2] J. Capart, *Les Débuts de l'Art en Égypte*, 1904, p. 228.
[3] G. Bénédite, *The Journ. Egypt. Archæol.*, Vol. V, 1918, p. 8.
[4] J. Capart, *op. cit.*, p. 234, Fig. 65.
[5] L. Adametz, *Herkunft und Wanderungen der Hamiten*, 1920, p. 104, Pl. II, Fig. 2.
[6] O. Antonius, *Grundzuge einer Stammesgeschichte der Haustiere*, 1922, p. 38, Fig. 30 (after Capart).
[7] F. P. Stegmann, *Die Rassengeschichte der Wirtschaftstiere*, 1924, pp. 53–4.
[8] *Ibid.*, 1924, p. 54, Fig. 14.

figures,[1] the oldest of which appears to be that seen on a potsherd of Predynastic date where it is shown with a long tail and associated with a goat.[2] Another excellent figure is that on the engraved slate palette of Predynastic date in the Museum at Cairo. On this the long tail and mane are clearly seen, and on the same slate are figured domestic oxen and the domesticated ass.[3] The same sheep is also shown on the papyrus of Neb-Qued in the Louvre Museum[4]; in a scene taken from the tomb of Ti (Fourth Dynasty) and reproduced by Maspero; on the wall of a hypogeum to the south of Saouadeh[5]; and on the wall on the tomb of Khnemhetep II at Beni Hasan (Twelfth Dynasty).[6]

The above sheep does not appear to be known in a mummified state, and actual remains seem to be rare. Lortet and Gaillard have described some fragments of skulls obtained by de Morgan from the Predynastic kitchen-middens of Toukh, near Negadah.[7] The remains from the Armant settlement probably belong to the same sheep, which, judging from the few bones, appears to have had long and slender legs.

With regard to the origin of *Ovis longipes palaeoaegypticus* there is some difference of opinion. Its descent from the Barbary wild sheep (*Ammotragus tragelaphus* Desm.)[8] is not possible, as this does not appear to have furnished any domestic sheep. Most authorities suggest Asia as the source of origin, though, according to Lortet and Gaillard[9] this has not been sufficiently demonstrated. They point out that from the great distribution throughout North Africa of living races of *Ovis longipes*, one might regard the sheep as belonging to the indigenous fauna of Africa. Among the domestic sheep of Europe which present some resemblance to the Predynastic sheep of Egypt is the Zackelschafe (*Ovis strepsiceros L.*) which occurs in Crete, Turkey, Wallachia, Transylvania and Hungary. This is divided into four races by Fitzinger, viz. *cretensis*, *dacicus*, *turcicus*, and *arietinus*. The first two belong to the autochthonus races of Crete and Wallachia. Fitzinger considers that the species (*Ovis strepsiceros*) originated in S.E. Europe : in Crete or the Grecian Archipelago, and later penetrated to Hungary, Turkey, Wallachia and Moldavia. Lortet and Gaillard consider the Toukh sheep of Egypt to be distinct from the *cretensis* race, but admit a resemblance to the *dacicus* race which is the least mixed and purest. Stegmann[10] regards *Ovis strepsiceros* as derived from the urial (*Ovis vignei cycloceros*) crossed with another west Asiatic long-tailed steppe-sheep, and considers that this sheep was brought to Egypt along with the zebu from Asia through Arabia and Ethiopia by immigrating nomads. A similar sheep is reported to occur to-day in the central part of Arabia. From Egypt, it is suggested, this sheep spread later to North Africa and to Europe.

Much information concerning the domestic pig in Ancient Egypt is contained in an important

[1] See David Paton, *Animals of Ancient Egypt*, Princeton, 1925, pp. 8–9.
[2] O. Antonius, *op. cit.*, p. 42, Fig. 32 (after Capart).
[3] J. de Morgan, *op. cit.*, Pl. III ; and Lortet and Gaillard, *La Faune Momifiée de l'Ancienne Egypte*, Arch. du Mus. d'Hist. Nat. de Lyon, Vol. 8, 1903, p. 91, Fig. 49 (after de Morgan).
[4] Ibid., p. 87.
[5] Ibid., p. 91.
[6] P. E. Newberry, *Beni Hasan, I.*, Pl. 35 ; and Griffiths, *Beni Hasan, III*, 1896, Pl. III, No. 35.
[7] Lortet and Gaillard, *op. cit.*, Vol. 8, 1903, pp. 88, etc. ; Vol. 9, 1907, p. 69.
[8] Two mummies and a skull of this wild species have been described from finds in the hypogeum near Gizeh. See Lortet and Gaillard, *op. cit.*, Vol. 8, 1903, p. 103.
[9] Lortet and Gaillard, *op. cit.*, Vol. 8, 1903, p. 100.
[10] F. P. Stegmann, *op. cit.*, 1924, pp. 130, etc.

article by Professor P. E. Newberry on "The Pig and the Cult-Animal of Set."[1] He points out that the domestic pig was already known to the Egyptians of Predynastic times, and small clay models of it have been found in graves of that period at Abydos and elsewhere in Upper Egypt. A glazed figure of a sow dating from the First Dynasty has been recorded from Abydos.[2] Professor Newberry rightly emphasises the fact that the domestic pig is not a pastoral animal but is more closely connected with an agricultural life. The ox, sheep and goat can be driven from pasture to pasture, but the pig has to be housed, at least during part of the year. Unlike the other animals, it is only useful when dead, as it gives neither milk as do the cow and the goat, nor wool as does the sheep.

The abundance of pig remains at Maadi and Benisalâme seems to indicate extensive pig-breeding in Lower Egypt. Professors Menghin and Amer consider it possible to regard the Delta region with its marshes as the pig-breeding centre of prehistoric Egypt. According to Menghin, the Neolithic complex of Lower Egypt is based upon a proto-Neolithic civilisation, characterised by the breeding of swine.[3] From the presence of pig-bones at Armant, Toukh and Badari, it may be inferred that the practice of pig-breeding was carried on there also in ancient times.

J. W. J.

[1] P. E. Newberry, *Journ. Egypt. Archæol.* Vol., XIV, 1928, pp. 211–225, Pls. XVIII–XIX.

[2] See Petrie, *Abydos*, II, 1903, p. 25, Pl. VI, No. 66; also Newberry, *op. cit.*, 1928, Pl. XVIII, Fig. 4.

[3] O. Menghin and M. Amer, *op. cit.*, 1932

LEVEL I

EXPLANATION. In the top left corner of each square are the types or classes of pots found. Sherds which could not be allotted to any particular class are excluded. For Incised read Point-burnished. The word sherd is to be understood after Rippled, Incised, Re-used, etc. Opposite to the types, in the top right corner of the square, are given the Sequence dates, when known. Underlined types and Sequence dates show that a fragment of the pot from rim to base remained. In the middle of the left side are the pottery objects other than pots or sherds. In the bottom left corner are the types of Flint implements with the number of specimens in brackets after them. In the middle of the right hand of the square are the stone objects, other than the classified implements, and in the bottom right corner are the shells and all other objects not in the above classifications.

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†=traces of Roman disturbance in the square.
x=re-buried in Egypt.

	6	5	4	3	2	1
A				†	†	P 23 35–73, 80
B		†		†	†	R 81 38–67 14b 1 (1)Φ
C	D 1 63 D 16 46–55 B † 4 (1) 6b (1)Φ 15b (1)Φ	B. P. Mk. R † 10b2 (1)Φ 14b10 (1)Φ 15i (1) Φ		R 8 †	R 84 42–77 B R 8 †	P 15–17 30–58, 72 R Incised 2 P Mk. ⊿ (1) †
D	P 24 36–67 B 4 (1) 14b10 (1)Φ 15i (1)Φ	6b (1)⊿ 10a (1)⊿Φ	SB Incised Φ 1 (1)Φ 6d (1)⊿ 21 (1)Φ		R P.Mk. Pig Φ Shell Torso Φ	B 29 30–58 R P.Mk. ⊿ †
E	B 35h Mah B 29 30–58 15f (1)⊿Φ 22 (1)Φ	R 69 36–71 1 (1) 15d (1) 21 (1)	P 22 33–80 P B R 7a (1) 14b7 (1)⊿ 15g (1)Φ	P 22a 44–45 R 44 (A) 58–63 P. Mk. R or T (A) Object 4 (1)	R 65 47–73	P 22a 44–45 R R 83 33–78 P 18y NUB. 12f (1)Φ 20 (1)Φ
F	R 33b (43–71) 78, 81 15a (1)Φ	21 (1)Φ	B 35 32–51, 70 B 29 30–58 B P Ripple S B R 24 or 26 42–81 6b (1) 22 (1)	R 16 51–80 R 33a 43–66, 80 D 31 (A) 40–45, 48 R 86p Mah. R 42 53–66 B P or S (A) 8 (1)⊿Φ 24 (1)	P 22 33–80 R 12b 34, 62 P 41a 42, 53 R 81 38–67 SB B R 4 (1)Φ 16b 2 (1)Φ	

	7	8	9	10	11	12	13	14
T	1 (1)	Incised Φ 1 (1) 4 (1)	Rippled Red Stone Grinder 12c 2 (1) 15d (1)	B 19–27 30–80 SB Boat Φ Animal Φ Granite Grinder 1 (1) 2 (1)Φ 4 (1) 7b (1)Φ 12c (2)ΦΦ 12c (1) 13 (1)Φ	L 12d 68–78 (Joins frag. H. 13) 4 (1) 12c1 (1) 12c2 (1)⊿ 18b (1)⊿	16a (1)Φ	P 68 31–39 4 (1)⊿	
S								Keel P R 9 ?Φ
R							R 81k 46 6b (1) 9d (1)	D 1 (A) 63 B 74 1–61 76 Keel PR 9 ? Bull 3 (1) 13 (1) 13a (1) 15b (1)⊿Φ 15d (1)
G		2 Incised Φ P. Mk. Object 1 (4) 2 (1)Φ 3 (1) 6a (1)Φ Red Stone Grinder 8 (1) 12f (1) 15b (1) 15d (1) 22 (1) 24 (1)Φ	Incised Φ Black Granite Flake Red " Granite Grinder Breccia Grinder (frag.) 22 (1)	L 12d 68–78 Granite Grinder 11b (1) 15d (1)	D Animal (frag.) Granite Grinder Limestone Grinder 11b (1) 21 (1)Φ	SB T Red Sandstone frag. Φ Granite Grinder 6b (1) 12b (1) 18a1 (1)Φ	Keel Φ	B 2d (57–64) R Re-used Φ Incised Φ 1 (2)⊿ 3 (1) 4 (1)
H	1 (1) 12c2 (1) 15f (1)		22 (1)			P 23c 35–68, 80 R or T (A) Incised Bull Φ 2 Limestone Grinders Spiral Φ 6b (1) 9c (1) 22 (1)Φ	L 12d 68–78 (Joins frag. G. 11) Slate (frag.) x Haematite Pebble x 3 (2) 4 (1) 12c 2 (1) 13 (1)	P or B (A) Animal 7b (1) 13 (1)Φ
J	B 11a 35–61 R or T (A) Granite Grinder 1 (1)⊿ 2 (1)Φ 4 (1) 12c1 (2)Φ 21 (1)	P 23c 35–68, 80 Animal 1 (1) 2 (1) 3 (1)⊿Φ Copper Ring		L 8δ 72–80 L 19d 62–66 R (⊿) Bull Φ Red Stone Grinder Spindle Whorl Sandstone Quern (frag.) 1 (2) 6b (3)Φ 6c (1) 12c2 (1)⊿ 12e (1)⊿Φ Spatha Rubens	P 11 31–71, 80 R 84t 57–62 Ring Φ Granite Grinder x 13 (1)Φ 21 (1)Φ	Slate (frag.) x Granite Grinder 1 (4) 6b (3)⊿Φ 11b (1) 21 (1)	Keel (black) (ΦΔ) Animal frag. 6b (1)⊿ 11a (1)⊿Φ 11b (1) Spatha Rubens	D 93bΦ (38–43) R (A) R or T (A) Breccia Grinder Chip red sandstone 1 (5) 2 (3) 7a (1) 8 (2)⊿Φ 9a (1) 9b (1) 14b3 (1)⊿Φ Oyster 15a (1) Nerita Polita pierced Φ
K	P or L (A 11a (1) 15i (1)		L 33n 71, 78 L 36 58–81 R 84 42–77 Bull 6b (1) 12c1 (1) 12d (1) 15d (1) 23 (1)Φ	Sand Pebble Φ Granite Flake 6a (2) 6b (2)Φ 7c (1)⊿Φ 9b (1) 12b (1) 12f (1)Φ 15d (1) Shell Bangle	6b (1)⊿ 9a (1)⊿Φ Flint Grinder 12b (1)Φ Granite " 12c2 (2)Φ 15e (1)Φ 21 (1)Φ 22 (1)Φ	TO (1031) ⊿ 9d (1)	B Keel Boat 1 (2)	P 24m 3 50–58 P 26–28 34–50, 72 Flint Grinder 1 (2) 11b (1) 12c1 (1) 12c2 (1)
L		P 63 31–44 B 66b 36, 44 Incised Φ 1 (1) 12c1 (1)Φ 15i (1) 18b (1)Φ	L 17 45–82 Keel PR9d ?Φ † Red Granite Grinder 12f (1) 14b7 (1) 21 (1)	D RΦ 1 (1) 12c1 (1) 15a(2)Φ 15c (1)⊿Φ 24 (1)Φ	D 93b (38–43) 14a (1)⊿Φ	R 84 42–77 L 7f ⊿ (48–53) Stone Rim 1 (1) 6b (3)⊿Φ 15a (1)	R (A) Animal Φ 12e (1)Φ 14b 8 (1)Φ 15a (1)	L 12d 68–78 L 46m 77–80 Keel PR 9d ? Spindle Whorl Φ 4 (2)Φ 7b (1)Φ 15d (1)
M		B 2C ⊿Φ 2 Incised 2 (1) 4 (2) 6b (1)Φ 11b (1)⊿Φ 16 b 3 (1) Bone PointΦ	P 23 35–73, 80 P. Mk. Flint Pounder x 15a (1)	R 84 42–77 B 1 (2) † 2 Granite Pounders x 7b (1)Φ 1 Granite Flake x 12c2 (1)Φ 12e (1)Φ 14b9 (1)⊿Φ 15a (1) 15j (1)⊿Φ	P 23c 35–68, 80 R23g 48–57 R 3 33–64 R3f7 1 (1) 4 (1) 6a (1) 6c (1)⊿ 12c1 (1) 12c2 (1) 15i (1)	R or T (A) Granite Grinder 4 (1) 12c1 (1) 12c2 (1)⊿ 21 (1)	R 83 33–78 B 54m 62 9b (1)⊿Φ 16c2 (1)⊿Φ 18b (1)Φ	R 93 37–58 B Slate frag. xΦ⊿ Granite Grinder Agate Pebble 1 (2) 2 (1) 4 (2) 12c1 (1) 12c2 (1) 14b5 (1)Φ Mutela Dubia
N	B 22 Bone Point 1 (1) 4 (1) 11b (1) 12c1 (1) 12c 2 (1) Bone PointΦ	P 22 33–80 B 74 31–61, 76 2 Incised Φ P 6 36 P 22 33–80 B Object Φ Frag. Quern. 12c 2 (1)	B Animal (frag.)Φ 4 (1) 15i (1) 18c (1)Φ	B 11 31–63 Keel Φ Bull Φ Sandstone Quern x 1 (1) 6a (1) 11b (1)Φ 12c2 (4) ⊿ & Φ 16b1 (1)Φ	P 11 31–71, 80 P 19g (43–44) 41 R 3b 31–73 P 56–59 30–58 B 29 Figure Φ Sandstone Flake Granite Quern (Used for Haematite) 1 (1)⊿ 12b (1)	R 3e 37–53 P 21 35–48 B Incised Φ Alab. Hammer Stone Granite Flake x 12c 1 (1) 12c2 (1) 2 (1)	R 3c 31–71, 80 (43–44) 41 31–73 30–58 12c2 (1) 15c (1) 18a1 (1)Φ	3 (1)⊿Φ 12c2 (1)
O		B P 12f (1)⊿	B Animal (frag.)Φ 4 (1) 15i (1) 18c (1)Φ B P	R 26 58, 72–80 R 36 53–77 B P. Mk. (? Intrusive)Φ 6b (1) 13 (1) 14a (1)Φ 15d (1) 16c1 (1)Φ		B 50 48–66 C 2 (1)	R B Object ΦΔ Granite Flake	Re-used Φ

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†=traces of Roman disturbance in the square.
x=re-buried in Egypt.

	6	5	4	3	2	1
A	P	B 12a 57 B		B 21b B † 15g (1)	P P † Sandstone Quern	P B 8 (1)
B		B 89 Nub. B † 14b1 (1)		B58–64 35–68 B 25 30–56, 59 †	R 32a 57, 81 P 22 33–80 B †	B29 30–58 P Goose Φ Object Φ † 14b10 (1)
C	15f (1)			P D †	P 22 33–80 Slate? Grinder 11b (1) ⊿ Φ 15i (1) ⊿ 22 (1)	P. Mk. Granite Flake x
D					17 (1) ⊿ Φ	
E						
F						

	7	8	9	10	11	12	13	14
T	Incised Φ Granite Grinder Limestone ,, 1 (1)	R 3f Keel Φ ⊿ Incised Φ Flint Pounder 1 (1) 6b (1) 10b3 (1) Φ 12c2 (1) 16g (1) ⊿	B 33 38 Re-used Φ 1 (1) 2 (1) 7a (1) ⊿ Φ 10b 3 (1) Φ 18a 1 (1) Φ		Dec. Φ ⊿ 2 Keels Spindle Whorl Φ 11b (1)	B 25 30–56, 59 R 85–66 42–77		
S		Keel Φ ⊿ Rippled Agate Pebble x Flint Pounder	P 4–70 31–47 R 26 or 33 43–80 Incised 10 Φ	B R 43f (not Rippled)	P 11 31–71, 80 Animal	R 1 D 57–71 Agate Pebble	Keel	
R	2 (1)	4 (1) 15a (2) Spatha Rubens x	12c2 (1) Φ	4 (1)	15a (1)	Keel ? S B Incised 31–70 S B B 1 Animal 1 (1) 2 (1) 11b (1) 19b 1 (1) ⊿ Φ	Flint Pounder 1 (2) ⊿ 2 (1)	
G		L 17n 56–78 Incised Animal Agate Pebble	R 84 42–77 Animal 6a (1) 15i (1) ⊿ Φ	R 3f 5 53–60 D 49b (Larger) (57–66) P 34a 50 P 23–24 38, 73, 80 Keel Leg Φ Slate (frag.) 4 (1) 7b (1) 12b (1) 12c 1 (1) 12c 2 (1) ⊿ Φ 15a (1) Spatha Rubens	R 3f 4 6b (2)	R 95 51 Breccia Grinder	S B 12e (1) 15i (1) Φ	1 (1)
H	1 (1)	B R 36h (not rippled) 31–61 B 66–68 Spindle Whorl Φ Granite Flake x 2 (1) 11b (1)	R. 3f7 Φ ⊿ R or T ⊿ 1 (3)	D 31–33 40–55 Carved object (Intrusive ?) Φ 4 (1) 14b1 (1) Φ 16b1 (1) Φ	Spindle Whorl 17 (1)	P 63–67 ⊿ 31–44 Re-used Φ Figure Boat Φ 1 (1)	Keel Φ Boat (frag.)	Incised Spindle Whorl 6b (1) 14b 2 (1) ⊿
J			Keel 1 (1) 2 (1) 6b (1) 8 (1) 18a2 (1)			L 7 39–81 Keel Φ 12c2 (1) Φ	Keel ? Incised Animal (frag.)	
K		R 3f 5 53–60 Incised Φ Re-used Φ † 6b (1) 15a (1) ⊿	† Granite Flake	† 12c1 (1) ⊿	†	P 66–69 31–41 P 16 32–42 R 33b (43–71), 81 P B	Flint Pounder x 2 Naticae Mamillae Φ	Keel Basalt Flake Spatha Rubens x
L	Granite Grinder 6a (1) 15e (1)							
M	S.B. 63–66 ? B R R 3f 8 12c2 (1) Spatha Rubens	C ⊿ Φ B. R or T ⊿ † Slate (frag.) 4 (1) Φ 16c 1 (1) ⊿	R 26c 58–61 Bull Φ † 1 (1)	† .	6b (1)	Keel (Φ ⊿) Spindle Whorl x Granite Flake x	R 23c (Buff Coating) (38–67?) P 15 32–47 Incised Spindle Whorl 1 (1) 7b (1) Φ 12c 1 (1) 13 (1) 15a (1)	P 23 35–73, 80 Keel Boat Φ 1 (1) 11 (b) 15a (1)
N	B 11a (1) Φ Cyprea Annulus Φ	B 11 31–63 S B B Incised Φ Re-used Φ Spindle Whorl 7b (1) 15a (1)	P Keel Φ Incised Boat 6b (1 11b (1)	D 31–35 40–55, 59 B 27 31–55, 63 Figure 4 (1) 6b (1) 12c 1 (1) 12c 2 (1) Φ 15a (1)	1 (1) ⊿	B 88 Nub Animal (frag.) 15e (1) ⊿	F 67 37 Flint Hammer x Granite Flake x 1 (2) 2 (1) 4 (1) Φ
O		L. 7 43–81 Sherd with relief Φ 15a (1) Φ		B 23 or 27 31–55, 63 11b (1) 13 (1)	B R T Flint Pounder 10b2 (1) 10b3 (1) ⊿ 11a (2) 16c1 (1) Φ Spatha Rubens	Buttocks Φ 7a (1) Nile Oyster	R 44l (51–63) L 26 46–72 1 (1) 6a (1) 12c2 (1)	R 8f4 B 88 x (2) Nub. 11a (1) ⊿ 15d(1) ⊿ Φ Shell (Conus)

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	6	5	4	3	2	1	7	8	9	10	11	12	13	14	
A				16a (1)		B 11 31–63	Sherd (Δ)		Turtle Shell ?		4 (1)	13b (1)		Keel Φ 12f (1) Δ	T
									R 84 32–77						S
														Re-used Φ	R
										7c (1) Δ Φ		15a (1		12e (1) 18a 2 (1) Φ	G
B			4 (1) 12c 2 (1) 15e (1)				P 23–24 38–78, 80 Dec. P 63–71 31–47 R or T (A) 15i (1) Φ			B 12–17 31–61					H
							1 (1) 12c 1 (1)	B 84 30 (–48) D 7–8 40–63 2 Bulls Φ Calcite Crystal Φ 4 (2) 12c 1 (1) 13 (1) 14b 1 (1) Φ 15i (1)					Boat Φ 6b (1) Δ	P or B (A) 4 (1) 11a (1) Δ Φ	J
C			1 (2) Δ 4 (1) 9a (1)	Keel 24 (1)	P 18 34–35 P 18f 2 36–43 P Keel B	Keel 1 (1) 4 (1) Δ 6b (1) 9b (1) 12d (1) Φ 15a (1) Φ	P B (A)	R †	†	†		1 (1) Δ	P 24 36–48, 57–67 1 (1) 15a (1)	S. B. 4 (1)	K
D							B 1 (1) 4 (1)	R Incised Figure x † Granite Flake x 1 (1) 4 (1) 13 (1)	C Φ S B Incised Φ B † Breccia Pounder x 11a (1) 11b (1) Δ 14b 4 (1) Δ Bone Point Φ 15d (1) Spatha Rubens	S B B Keel † 11b (1) Δ	B R 27 52, 72, 78 P 24 36–48, 57–87 Boat Φ Flint Pounder x Granite Flake x 11a (1) 11b (1) 12c 2 (2) Δ 17 (1) Δ Φ Spatha Rubens x 2 19a (1) Δ Φ Shell Bangle Φ Δ			Slate Palette (frag.) 4 (1) 8 (1) Δ	L M
E									R 16b 2 (1)	R Object Φ		S. B. Keel ? 1 (1) Δ 6b (1) Δ Φ 12c 1 (2) 12c 2 (1)	D P B 9b (1)	21 (1) Φ	N
F							B 15d (1)		S B			P 24 (A) 38–48, 57–67 5 (1) Δ Φ 10 Spatha Rubens Φ	D 2 52 P. Mk. Δ 19c (1) Δ Φ		O
	6	5	4	3	2	1	7	8	9	10	11	12	13	14	

PART III

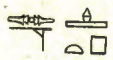
CHAPTER XVI

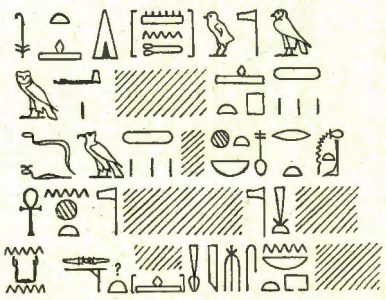
STONE OBJECTS

By T. J. Colin Baly.

It is practically impossible for any excavator to decide that any group of objects cannot be of use to the future worker; in this chapter, therefore, have been collected all the miscellaneous stone objects from Armant. The facts that few are of any intrinsic importance, and that still fewer have any *fundplatz* does not absolve us from the duty of publication. Those which have no stated *fundplatz* were bought during our attempt to secure any material from the Bucheum which might be at large in the neighbourhood.

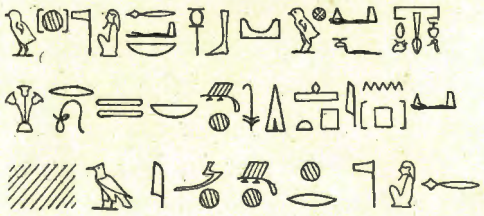
Section A. Dynastic Fragments.

(1) Seated figure (of a scribe ?). Black granite. Dimensions: Base 30 × 31 cms. ht. 27. Saitic. Inscribed in horizontal lines on knees (R–L) with the usual offering formula. The name might be  which is known elsewhere.



(2) Seated figure of a "great royal wife." Black Basalt. Dimensions: Base c16 × 16 cms (broken). ht. c50. Dyn. XVIII–XIX. Inscribed on seat to left of legs. Dêir al-Abyad.

(3) Fragment of Statue. To right of inscription remains of arm and shoulder. Black granite. Dimensions: 26 × 19 cms. width of arm 12 cms. Saitic. The name *Ḥ3-r-ω3-t3ω.i* does not seem to occur in this form elsewhere.



(4) Black granite fragment. Dimensions : c10 × 11 cms. Saitic ?

(5) Two limestone fragments inscribed in vertical lines. Ptol-Rom. Possibly from the Temple of Armant.
(6) Three fragments of sandstone inscribed in vertical lines. Ptol-Rom. Possibly from the Temple of Armant.
(7) Fragment of sandstone with a small scene in relief—apparently offerings being made to a god. Dimensions : Base 11 cms. ht. 15. Ptol-Rom.
(8) Sandstone fragment with two female figures in relief. Ptol-Rom.
(9) Sandstone fragment with king's head in relief. Dimensions : c25 × 20 cms. Ptol-Rom.
(10) Limestone Stamp. Dimensions : c7 × 5·5 cms. Second Intermediate. Professor Newberry reads the name *Nb-nfr* and points out that the feminine form *Nb-nfr.t* occurs in the New Kingdom (Ranke. *Personen-namen*, p. 191). He compares the stamps of Seḳenenre and Sesamun in his *Scarabs*, p. 89 and Figs. 95 and 96.
(11) Fragment of skirt from a statue. Black granite. Dimensions : c15 × 14 cms.
(12) Fragment of wig from a statue. Black granite. Dimensions : c14 × 4 cms.
(13) Feet of a joint statue. Black granite. Dimensions : Base c35 × 20 cms. ht. c25.
(14) Fragment of torso of seated Osiride figure. Black granite. Dimensions : c30 × 30 cms.
(15) Sandstone stela showing seated bull-headed gods or cow-headed goddesses sitting facing each other. That on the left wears the crown of Buchis. Winged disc at top. Very fragmentary remains of inscription ; subject not discoverable. Dimensions : c33 × 21·5 cms.

Section B. Coptic Fragments.

These fall into two classes ; the tombstones and a few decorated fragments. None of these objects is of great importance and the corpus of tombstone types must not be taken as implying a belief that the material is sufficient for definitive work ; the arrangement is merely made to facilitate reference by any future worker.

The corpus is placed first, after which will be found transcriptions and translations of those inscriptions of any value. The register contains dimensions and other details of all the specimens. In the corpus it will seem to those familiar with the Cairo Catalogue, or indeed with any body of material containing tombstones of the Armant type, that the types have been unnecessarily finely divided, since some of our major classes are to be found combined in fuller examples. As the intention of the arrangement is, however, to simplify reference, a further broadening would destroy its value ; already many fragments are borderline cases.

I. Dove with wings raised.
  A. With wreathed cross above.
    1. With pillars beside the bird. 16 ?
    2. Without pillars. 17, 18, 19, 20.
  B. Without wreathed cross.
    1. With pillars beside the bird. 16 ?
    2. Without pillars.
II. Wreathed cross.
  A. With pediment above. 21, 22, 23.
    1. With pillars beside.
      (a) Inscribed. 24.
      (b) Uninscribed.
    2. In rectangle with decorative fittings in corners.
      (a) Inscribed. 25, 26, 27, 28, 29, 30 ?
      (b) Uninscribed.
  B. Without pediment.
    1. With pillars beside. 31 ?
      (a) Inscribed.
      (b) Uninscribed.
    2. In rectangle with decorative fittings in corners. 32, 33.
      (a) Inscribed. 34, 35.
      (b) Uninscribed.
III. Patterns with two crosses in square below and one in a pediment above.
  A. Inscribed below pediment.
    1. With A and Ω in the pediment. 36.
    2. With other filling in the pediment corners.
    3. With no filling in the pediment corners. 37, 38.
  B. Uninscribed below pediment.
    1. With A and Ω in the pediment. 39.
    2. With other filling in the pediment corners. 40.
    3. With no filling in the pediment corners.
IV. Single crosses.
  A. With palm leaves beside. 41, 42.
    1. With wreathed cross above. 43.
    2. Without wreathed cross above.
  B. Without palm leaves. 44, 45, 46.
    1. With wreathed cross above, 47, 48.
    2. Without wreathed cross above.
V. Single cross wreathed. 49, 50, 51.
VI. Miscellaneous. 52, 53, 54, 55, 56, 57, 58, 59, 60, 61.
VII. Fragments of pediments. 62, 63, 64, 65, 66, 67, 68, 69.

Finally a few miscellaneous items have been collected :
73–75. Limestone capitals.

76. Fragment of inset decoration. Sandstone.

77 and 78. Relief patterns from pottery coffins from " Dêir of St. John."

79. A Coptic Graffito from the cliffs. What it represents is not clear but we may compare perhaps the painting of the Eunuch of the Queen of the Ethiopians riding in his chariot and reading ; this is from the Church of St. Macarius in Cairo. Also the Ostracon published in *The Bucheum*, Pl. LXXVII/204, and register of Demotic ostraka.

Miss M. S. Drower, to whom the translations are due, comments on the inscriptions as follows : " The inscriptions on these stelæ are of the typical Armant type, as found throughout the Cairo Catalogue and in a few cases in Hall : ' Coptic and Greek Texts in the British Museum.' The Greek formula Εἷς θέος is the most popular[1] ; it is notable that nowhere appears the phrase, frequent on the Badari tombstones,[2] ⲁⲫⲕⲁ ⲥⲱⲙⲁ ⲉⲣⲣⲁⲓ, ' He laid down the body.' The inscriptions are very fragmentary and contain nothing of special interest, being brief versions of known formulæ."

24	(1) ⲉⲧⲭⲁⲣⲓⲥ	Grace.
	(2) ⲫⲁⲱⲫⲓⲕ̄ⲥ	The 26th day of Phaophi.
25	(1) ⲉⲓⲥ ⲑⲉⲟⲥ	One God.
	(2) ⲓⲁⲕⲱⲃ	Jacob.
26	(1) ⲓⲁⲕⲱⲃ +	Jacob +,
	(2) ⲙⲟⲛⲟⲭⲟⲥ	Monk,
	(3) ⲡⲁⲣⲑⲉⲛⲟⲥ	Recluse.
27	(1) + ⲉⲓⲥ ⲑⲉⲟⲥ	+ One God. . . .
	(2) [+?] ⲥⲟⲫⲓⲁ [ⲁⲥⲙⲧ]	Sophia ; she
	(3) ⲟⲛ ⲙⲙⲟⲥ	. . . . . died on the
	(4) ϫⲁⲩⲧ ⲛⲕ	third (day) of K[hoiak] (?).
29	(1) + ⲉⲓⲥ ⲑⲉⲟⲥ	+ One God.
	(2) ⲓⲱⲁ[ⲛⲛⲏ]ⲥ	Johannes,
	(3) ⲡⲣⲉ[ⲥⲃ/]ⲡ?ⲁ	priest,
	(4) ⲧⲁⲡⲏ	Patapē (?).

Patapē appears to be a name but it is difficult to see how it fits in here.

35	(1) . . . . [ⲙⲁⲣ?]	. . . . [Mary]
	(2) ⲓⲁⲙ . . . . [ⲧⲙⲟⲛⲁϫⲏ?]	. . . . the good
	(3) ⲉⲧⲛⲁⲛⲟ [ⲩⲥ ⲁⲥⲙⲧⲟⲛ ⲙ̄]	nun ; she died
	(4) ⲙⲟⲥ ⲛ̄ⲥⲟⲩ [. . *date* . .]	in [. . *date* . .]

[1] See Erik Peterson : " ΕΙΣ ΘΕΟΣ. Epigraphische formgeschichtliche und Religionsgeschichtliche Untersuchungen." *Forschungen zun Religion und Litteratur des Alten und Neuen Testaments ; Neue Folge*, Heft. 24 ; Vandenhoeck und Rupprecht, Göttingen, 1926. A list of monuments from Armant bearing this formula is given.

[2] Qau and Badari III, ch. XIX.

48	(1) ⲉⲓⲥ ⲑⲉⲟⲥ ⲟ ⲃⲟⲏⲑⲱ	One God who helps
	(2) ⲛⲁⲙⲏⲛ// ⲉⲧⲉⲗⲉⲧ	(us), Amen. Died
	(3) ⲧⲏⲅⲉⲛ ⲧⲣⲓⲁ ⲉⲡ	Hygeia (??) the 2nd
	(4) ⲉⲓⲫⲓ ⲃ ⲧⲏⲥ ⲓⲣ//	day of Epiphi, year 13
	(5) ⲓⲛⲁ^{sic}ⲕ	of the Indiction.
49	(1) ⲉⲓⲥ ⲑⲉ[ⲟⲥ ⲟ ⲃⲟⲏⲑ]	One God who helps
	(2) ⲱⲛ ⲙ̄[ⲙⲟⲛ] . . . . [ϩⲉⲣ-?]	[us] . . . . . [Her-] (?)
	(3) ⲙⲁⲓⲟⲩ ϩⲓⲛⲟⲩⲉ [ⲓ]	-maios, in peace
	(4) [ⲣ]ⲏⲛⲏ ⲙⲓⲉ ⲥⲟⲧⲏ ⲕⲓ (?)	(and) truth, the sixth (day) of
	(5) . . . . ⲓⲛⲁⲓⲕ/ ⲓ(?)/	Khoiak (?), . . . Year 10(?) of the Indiction.
53	(1) ⲉⲓⲥ ⲑⲉⲟⲥ ⲁⲃⲛ	One God. Jenpnoute.
	(2) ⲡⲛⲟⲩⲧⲉ ⲕⲁ·	The 21st
	(3) ⲙ/ ⲟⲣⲉ (?)	day of Mesore (?).

This name is also found on Tombstone 8445 of the Cairo Catalogue.

56	. . . . .	. . . . .
	(1) ⲧⲟⲥ ⲡⲉϥⲥⲟⲛ ⲛⲙⲟ[ⲛⲟ]	-tos his brother, the
	(2) ϫⲟⲥ ⲁⲙⲏⲛ //	monk. Amen.

There are no very common names ending in —tos. Faustos and Theopistos suggest themselves.

62	(1) [ⲉ]ⲣⲙⲓⲁⲥ ⲡⲣⲉⲥ[ⲃ/]	Hermias, priest,
	(2) [ⲉ]ⲧⲉⲗⲉⲧⲧⲉⲛ	he died on . . .
	(3) . . . . ⲓⲛⲁ[ⲓⲕ/]	. . . of the Indiction.
70	(1) [ⲉⲓⲥ ⲑⲉⲟⲥ ⲟ ⲃⲟⲏⲑ] ⲱⲛ ⲙⲁⲣⲓⲁⲙ ⲙⲏ [ⲁⲧ]	[One God who helps (us).] Mary.
	(2) [ⲡⲏⲑⲉⲓⲥ ⲟⲧⲁⲉ]ⲓⲥ ⲁⲑⲁⲛⲁⲧⲟⲥ	Do not [grieve, no man] is immortal
	(3) [ⲉⲛ ⲧⲱ ⲕⲟⲥⲙⲱ ⲧ]ⲟⲩⲧⲱ ⲉⲧⲉⲗⲉⲧⲧ	[in this world]. She died
	(4) [ⲏⲥⲉⲛ . . . . ⲡⲁ]ⲱⲛⲉ ⲧⲏ ⲓ̿ⲏ̿ ⲁⲙⲏⲛ	on the . . . of Pāone, year 18. Amen.
71	(1) + ⲉⲧⲉⲗⲉⲧⲧⲏ[ⲥⲉⲛ]	+ Died
	(2) ⲏ ⲙⲁⲕⲁⲣⲓⲁ ⲥⲓ·	the blessed
	(3) ⲙⲓ · ⲟⲛ ⲉⲛ ⲧⲏ ⲇ[ⲉ]	Simeon on the
	(4) ⲕⲁⲧⲏ ⲧⲟⲩ ⲙⲏⲛⲟⲥ	tenth of the month
	(5) ϫⲟⲓⲁⲕ ⲧⲏⲥ ⲁ̄ ⲓⲛⲇⲓⲕ/	Khoiak, Indiction 4.
	(6) ⲙⲏ ⲁⲩⲡⲓⲫⲏⲛⲉ ⲟⲧⲁⲉⲓ[ⲥ]	Do not grieve ; no man
	(7) ⲁⲑⲁⲛⲁⲧⲟⲥ ⲉⲛ ⲧⲱ ⲕⲟ	is immortal in this
	(8) ⲥⲙⲱ ⲧⲟⲩⲧⲟ	world.
72	(1) ⲡⲁⲡⲁ ⲓⲏⲥ	Father Pēsaiak (?)
	(2) ⲁⲓⲁⲕ/ⲙⲏⲁⲩ	Do not grieve,
	(3) ⲡⲏⲑⲏⲥ ⲟⲩ	for no
	(4) ⲁⲓⲥ ⲅⲁⲣ ⲁ	man is
	(5) ⲑⲁⲛⲁⲧⲟⲥ	immortal.

Section C. Greek Inscriptions.

80. Five fragments of a Greek inscription. Mr. T. C. Skeat contributes the following note:
" Mr. M. N. Tod has kindly suggested the following reading and restoration:

[Μετὰ τ]ὴν ὑπατείαν [τῶν δεσποτῶν]
[ἡμῶν Λ]ικιννίου Σ[εβαστ]οῦ τ[ὸ ϛ′ καὶ τοῦ ἐπι]-
[φανεστάτου Καίσαρος Λικι]ννίου τὸ β′, Ψῦρος Α.[- -
[- - ἀνέθηκεν εὐσεβείας χ]άριν ἐπ' ἀγαθ[ῶι.

" ' The year after the consulship of our Lords Licinius Augustus the sixth time and the most distinguished Cæsar Licinius the second time, Psyros son of A. . . . dedicated this in piety for good.'

" *Lines* 1–2. The date of the joint consulship of the Licinii has been the subject of much controversy, and it is only recently that a satisfactory solution has been put forward by E. H. Kase in his Princeton dissertation *A Papyrus Roll in the Princeton Collection* (Baltimore, 1933), pp. 32–36; he concludes that the joint consulship originally dated from A.D. 321, but that dating by it was continued for the next three years without change in the numeration of the respective consulships, the year being indicated by the additional formula τοῖς ἐσομένοις ὑπάτοις τὸ β′ (γ′, δ′). Since in the present inscription μετὰ τ]ὴν ὑπατείαν is certain, the date must be either 322, 323, or 324, but the additional formula which would have fixed it definitely is lacking. The omission of the formula, however, points rather to 322, before this temporary era had properly established itself.

" *Line* 3. For the name Ψῦρος see Preisigke, *Namenbuch*; the next letter might begin a verb, e.g. ἀ[νέθηκε, but on the whole a patronymic is perhaps more probable.

" *Line* 4. The formula is too common to need illustration; see for example Dittenberger's note on *O.G.I.S.*, 699, 6. εὐσεβείας is the most likely word, but alternatives are not of course excluded."

Section D. Arab Fragment.

81. Decorated Archstone of the 14th Century.

T. J. C. B.

REGISTER OF MISCELLANEOUS STONE OBJECTS

No.	Object	Type	Material	Size	Fundplatz	Date	Inscription	Refs in Text	Illustrations	Distribution
1	Seated figure	—	Bk. Granite	Base 30×31 ht. 27	Bought	Saitic	See text		Pl. LXX. 1	W.H.M.M.
2	"	—	" Basalt	Base 16×16. ht. 50	Deir al Abyad	Dyns 18–19	"Great royal wife"	259	Pl. " 2	Buried
3	Fragment of Statue ?	—	" Granite	26×19	Bought	Saitic	See text		Pl. " 3	Queen's, College, Oxford
4	" " "	—	"	10×11	"	Ptol. Rom.	See plate		Pl. " 4	Buried
5	2 inscribed frags.	—	Limestone	9×17 and 52×25·5	"	"	None		Pl. LXX. 6	"
6	3 " "	—	Sandstone	32×10 & 65×13 & 30×28	"	"	"		Pl. " 7	"
7	Same in Relief	—	"	11×15	"	"	"		Pl. " 8	Property O.H.M.
8	" " "	—	"	52·5×28·5	"	"	"		Pl. " 9	Buried
9	King's head in Relief	—	Limestone	25×20	"	2nd Inter.	See text	p. 260	Pl. " *	Property O.H.M.
10	Stamp	—	Limestone	7×5·5	"	?	None		Pl. LXX. 11	Buried
11	Fragment of Statue	—	Bk. Granite	15×14	"	?	None		Pl. " 12	"
12	" " "	—	" "	14×4	"	?	None		Pl. LXXI 13	"
13	Feet of a Joint Statue	—	" "	Base 35×20, Ht. 25	"	?	None		Pl. " 14	"
14	Frag. of Osiride "	—	" "	30×30	"	Ptol. Rom.	Indecipherable		Pl. " 15	"
15	Stela	—	Sandstone	33×21·5	"	Coptic	None		Pl. " 16	"
16	Frag. of Tombstone	I A 1	Limestone	37×32	"	"	"		Pl. " 17	"
17	" " "	" 2	"	50×32	"	"	"		Pl. " 18	Held
18	Tombstone	I A 2	Sandstone	68×45	"	"	"		Pl. " 19	Buried
19	Frag. of Tombstone	"	Limestone	17×17	"	"	"		Pl. " 20	"
20	" " "	"	"	27×19	"	"	"X the younger		Pl. " 21	"
21	" " "	II A	"	30×27	"	"	deacon . . . . "			
22	" " "	II A	Sandstone	34×29	"	"	"Theosebios"		Pl. " 22	"
23	" " "	II A	Limestone	40×36	"	"	Indecipherable		Pl. " 23	"
24	" " "	II A 1 a	"	34×33	"	"			Pl. " 24	"
25	" " "	II A 2 a	"	30×20	"	"			Pl. " 25	"
26	" " "	"	"	34×22	"	"			Pl. " 26	"
27	" " "	"	Sandstone	32×29	"	"			Pl. " 27	"
28	" " "	"	"	30×22	"	"			Pl. " 28	"
29	" " "	"	Limestone	57×34	"	"			Pl. " 29	"
30	" " "	"	Sandstone	15×11	"	"			Pl. " 30	"
31	" " "	II B 1	Limestone	30×28	"	"			Pl. " 31	"
32	" " "	" 2	"	15×15	"	"			Pl. " 32	"
33	" " "	"	"	33×30	"	"			Pl. " 33	"
34	" " "	II B 2 a	"	43×27	"	"			Pl. " 34	"
35	" " "	III A 1	"	31×15	"	"	See text	p. 262	Pl. " 35	"
36	" " "	III A 1	Sandstone	50×39	"	"	" pa . . . f . . . m . . . "		Pl. LXXII 36	"
37	" " "	" 3	Limestone	45×27	"	"	"The monk, Erieu"		Pl. " 37	"
38	" " "	" 3	"	45×37	"	"	"One God, (Di)ocletian"		Pl. " 38	"
39	" " "	III B 1	"	48×31	"	"	None		Pl. " 39	"
40	" " "	" 2	"	39×26	"	"	"		Pl. " 40	"

* Plate LXX was unfortunately lost in the Customs when the proofs were sent from Vienna and it was impossible to replace these figures in the time available.

REGISTER OF MISCELLANEOUS STONE OBJECTS—*continued.*

No.	Object	Type	Material	Size	Fundplatz	Date	Inscription	Refs in Text	Illustrations	Distribution
41	Frag. of Tombstone	IV A	Limestone	38×30	Bought	Coptic	None		Pl. LXXII 41	Buried
42	" " "	"	Sandstone	37×36	"	"	"		Pl. " 42	"
43	" " "	IV A 1	"	50×32	"	"	"		Pl. " 43	"
44	" " "	IV B	Limestone	35×27	"	"	"		Pl. " 44	"
45	" " "	"	Sandstone	45×27	"	"	Indecipherable		Pl. " 45	"
46	" " "	"	"	65×35	"	"	None		Pl. " 46	"
47	" "	IV B 1	"	42×21	"	"	See text		Pl. " 47	Held
48	Tombstone	V	"	64×28	"	"	See "	p. 263	Pl. " 48	Buried
49	Frag. of Tombstone	"	"	53×28	"	"	" ... *in* ...	p. "	Pl. " 49	"
50	" " "	"	"	61×22	"	"	" ... *onoq* ...		Pl. " 50	
							" ... *naith* ... "			
51	" " "	"	?	16×14	"	"	None		Pl. " 51	"
52	" " "	VI	Sandstone	28×21	"	"	" ... *oate* "		Pl. " 52	"
53	" " "	"	"	34×25	"	"	See text	p. 263	Pl. " 53	"
54	" " "	"	"	63×49	"	"	None		Pl. " 54	"
55	" " "	"	Limestone	41×40	"	"	"		Pl. " 55	"
56	" " "	"	Sandstone	25×15	"	"	"		Pl. " 56	"
57	" " "	"	Limestone	22×18	"	"	See text	p. 263	Pl. " 57	"
58	" " "	"	"	22×15	"	"	None		Pl. " 58	"
59	" " "	"	"	19×17	"	"	"		Pl. LXXIII 59	"
60	" " "	"	"	15×11	"	"	" ... *me* ... "		Pl. " 60	"
61	" " "	"	"	24×23	"	"	None		Pl. " 61	"
62	" " "	?	"	32×27	"	"	"		Pl. " 62	"
63	" " "	VII	Sandstone	25×17	"	"	"	p. 263	Pl. " 63	"
							See text			
							" Johann(es)			
							pek ... "			
64	" " "	"	"	22×16	"	"	None		Pl. " 64	"
65	" " "	"	Limestone	30×16	"	"	"		Pl. " 65	"
66	" " "	"	Sandstone	29×15	"	"	"		Pl. " 66	"
67	" " "	"	"	16×14	"	"	"		Pl. " 67	"
68	" " "	?	"	23×16	"	"	"		Pl. " 68	"
69	" " "	?	Limestone	13×12	"	"	"		Pl. " 69	"
70	" " "	—	Sandstone	?	"	"	"			
71	" " "	—	?	?	"	"	"			
72	" " "	—	Limestone	?	"	"	"			
73	Pilaster capital	—	Limestone	31×21	"	"	See text	p. 263		
74	" "	—	"	35×25	"	"	None		Pl. LXXIII 73	
75	Capital	—	"	20×16×16	"	"	"		Pl. " 74	
76	Decorative detail	—	Sandstone	22×12	"	"	"		Pl. " 75	
77	Relief from pottery	—	Pottery	8·8×5 and 4×3·8	Deir of St. John	Roman	"	p. 262	Pl. " 76	
78	coffin					XIV Cent.		p. "	Pl. " 77 & 78	Held
79	Graffito near Deir	—	On cliff	c6×4·5	Southern Deir	"	See text	p. "	Pl. " 79	*In Situ*
80	5 Inscribed frags.	—	Sandstone	Various	Bought	"	None	p. 264	Pl. " 80	Buried
81	Decorated Archstone	—	Limestone	59×25×21	"	"		p. "	Pl. " 81	"

CHAPTER XVII

A SAHARAN CULTURE

Discovery.

DURING the building of Bucheum House, and the excavation of cemeteries 700–900, a number of incised sherds was found just beneath the desert surface. With the sherds from the cemetery area some microlithic agate flakes were discovered. Later it appeared that these sherds did not correspond with " Pan-grave " or " C-Group " material, as had been supposed at the time, and in the winter of 1934 Fairman spent a fortnight at Armant testing several areas for further examples. A large quantity of sherds was found quite close to the house, but there were only a very few agate flakes with them.

The Plates.

The sherds fall into three main superficial groups : (1) undecorated, (2) incised with chevron and herring-bone patterns, and (3) impressed with dot patterns. These are illustrated on Pl. LXXIV, Figs. 2, 4 and 3. It is too soon and there is too little material available to make a proper classification of the wares.

Conditions of Finding.

The sherds are always found on, or just under, the desert surface, and a large proportion of them show signs of prolonged sandblast, some being concave at the edges, where the sand has eroded the centre, while in others long exposure has weathered away one side of the sherd. They are very small, the largest being 4·5 × 3·5 cm., while they average 2 cm. square. Nothing was ever found with them except the microlithic agate flakes. Among these was one (badly battered) micro-burin, two thick-backed lunates, and four definitely prepared flakes, one of which shows fine trimming on the edges. (Pl. LXXIV, Fig. 1, Nos. 3, 1 and 2, are the implements. The five lower flakes are *détaillage*.) Suliman Huzayyin identified these and suggests that they belong to the Neolithic or Late Sebilian III culture. A fish pit[1] was found on the fringe of the same area as the sherds, but this contained no pottery or other archæological evidence. Such pits are usually of late date (see *Badarian Civilisation*, 95 and 104, *The Bucheum*, 187, and L. Loat, *Gurob*, 1904), but there was nothing to show whether or not the pit was connected with the other remains. It is worthy of note that it was found close to traces of late occupation.

There can be little doubt that the sherds are the debris of a settlement from which the humus and lighter objects had been eroded, and not of a cemetery, and the following points are all in favour of this hypothesis : (1) the small size of the sherds ; (2) their freedom from salts (which are picked up by pottery buried in the soil) ; (3) their condition, for experience in the Sahara shows that, when graves are eroded by the wind, the tops of the pots are carried away by the drifting sand, leaving a ring, the remains of either the rim or the base.

[1] The contents were apparently " Cat fish " (see p. 277).

Date.

On archæological grounds an early date appears probable for the settlement, because :

(A) The site is some considerable distance from the present cultivation edge, and it could hardly have been so placed unless there was a local water supply which, since the Predynastic settlements are all on the desert edge, cannot have existed as late as that period.

(B) The evidence for extensive erosion, since neither the Predynastic settlements and cemeteries, nor the equally exposed Roman village have suffered similarly.

(C) There were no Predynastic or Dynastic objects in the settlement, while no fragments of its pottery appear in the sites of any other period.

(D) The presence of the agate microliths, though these can be only tentatively adduced as evidence, since their association with the sherds is not proved.

Nothing has resulted from the comparison of the material with that from other sites to alter the impression given by the circumstances in which it was found.

Comparative Material.

In Egypt, the obvious comparison is with the Nubian potteries, but closer investigation shows that there is no more than a superficial resemblance with Meroitic, " C-Group," or " Pan-grave " wares. Bretonne, Catalonian and East African Palæolithic (?) pot decoration shows as great an affinity to the Armant culture as that of any of the Nubian and Sudanese wares. The true connections of this culture are to be found in the Sahara, and Nubian resemblances must be attributed to infiltration from that area. There is a genre of pottery extending from north to south and east to west of the Sahara, and it is surely putting the cart before the horse to suggest, as has been done, that this is all an off-shoot from Meroë.

The first efforts to trace connections in the Sahara were made in the published works of the French authorities on that area, but, though much of great interest about the cultures of that district was found, it was not possible to make accurate comparisons from the details given about the pottery. For this reason, and since this is only a preliminary account of the new culture, detailed references to books are not given, but the following is a list of the more important works consulted. It includes one or two references to early pottery from Egypt, which did not prove of great importance for the present purpose :

Breuil, Henri et Leo Frobenius, *Afrique*, Paris, 1931 (pp. 74–76).
Cortier, M., *D'une rive à l'autre du Sahara*, Paris, 1908 (no pottery).
Chudeau, R., et E. F. Gautier, *Missions au Sahara*, Paris, 1908–1909 (*passim*).
Foureau, F., *Documents scientifiques de la mission Saharienne, Mission Foureau-Lamy*, Paris, 1905 (pp. 1100–1128).
Gimpera, Pedro Bosch, *El Problema Etnológico Vasco y la Arqueologiá*, Publicaciôn de la Sociedad de Estudios Vascos, San Sebastian, 1923 (pp. 25–26).
Menghin, Oswald, *Weltgeschichte der Steinzeit*, Wien, 1931 (pp. 471–472).
Monod, Théodore, *L'Adrar Ahnet*, Travaux et Memoires de l'Institut d'Ethnologie–XIX, Paris, 1932 (pp. 173–181).
Rabourdin, L., " Les âges de pierre du Sahara central " *Bull. Soc. d'Anthropologie*, 3e, Série, Tome IV., Paris, 1881 (pp. 115–162).
Thomas, " Récherches sur un atelier de silex taillés à Ouargla (Algerie)" *Materiaux pour l'histoire primitive et naturelle de l'Homme*, Tome XI, 1876 (pp. 71–75).

Breasted, James Henry, *The Oriental Institute*, The University of Chicago Survey, XII, Chicago, 1933 (p. 22).
Horner, Leonard, " An Account of Some Recent Researches near Cairo," *Phil. Trans. Roy. Soc. of London*, CXLVIII (1858), 53–92.
Brunton, Guy, " The Predynastic Town-Site at Hierakonpolis," *Studies Presented to F. Ll. Griffith*, London, 1932 (pp. 272–276).

It is clear from a study of these and other books on the Sahara, that no stratified sites have been found, or at least excavated stratigraphically. It is probable that erosion has prevented any from surviving. The bulk of the material described has been brought back by expeditions, which have not had the time or the personnel to carry out excavations, but whose members have collected, with more or less accurate records, such material as they thought might be of interest. Nevertheless, we have reason to be grateful to these expeditions, many of which were military in character. The *whole* of the material brought back is from the surface (unless from graves), and, therefore, conclusions from it are always open to doubt. If, when dealing with surface finds, certain pottery alone was found associated with one flint culture, and never with other different cultural remains, and, if other pottery was never found with these flints, the evidence would be as valuable as that from a stratified site, but far too little has been done, as yet, to establish such a series of connections.

Some writers report that pottery, generally similar to that from Armant, is found together with stone implements of a Neolithic type, but they sometimes record polychrome glass bangles from the same find, and attribute them to the same date ; since these bracelets are undoubtedly mediæval, their conclusions are open to suspicion.

Even if the flint work and pottery can be equated, this is only a partial step towards a complete solution of the problem of placing the culture in its proper chronological position. Though the flint work would give the local relative dating, there is no certainty or agreement about when the Neolithic culture was replaced by a metal age in the Sahara, so the date of the culture in relation to other countries would remain uncertain.[1] It is said by some that there was no copper or bronze age, but that the people passed straight from the use of stone to the use of iron—possibly at about 1000 B.C., but perhaps as late as Classical times, with the coming of new tribes into the area. Even A.D. 1000 has been suggested for the end of the stone age. Polished stone axes are said to have been used in the French Sudan during the memory of living man, and it is at least certain that current forms of iron tools and weapons in this part of the world have been copied from stone. Stone pestles and mortars employed to-day are identical with those found by Shaw in Libya hundreds of miles from water.

The whole question is largely, if not entirely, dependent on a final solution of the problem of climate, for, if it can be established that the Sahara has been in its present state since about 4000 B.C., the date of all the agricultural and fishing settlements in arid areas must be before that date. Broadly speaking, three views appear to be tenable. (1) That desiccation finally made the Sahara uninhabitable for the greater part of its area at the beginning of the European Neolithic period, resulting in a migration to the Nile Valley and the beginning of Egyptian civilisation. (In support of this, there are fossilised dunes in the south-west of the Sahara

[1] By Sahara is meant the interior of the desert and not the Mediterranean coast.

which contain no evidence of Neolithic culture, whereas Neolithic remains are to be found in the present moving dunes.) (2) That there was a rainy period as late as Classical times which made the desert again habitable, so that it was reoccupied then for the first time since the end of the Palæolithic period. (3) That at various times there have been very heavy rains over a short period, sufficient to allow of temporary settlement and cropping. At present no conclusion can be reached with regard to the truth of these contending theories and the dating of settlements and other remains of human habitation must be left in abeyance.

For actual comparison with the Armant finds, the original material proved more satisfactory than the publications. We were kindly permitted to handle and examine freely all the material brought back by W. B. K. Shaw from the Libyan expeditions of 1933–1934, and 1934–1935.

With this material there was much of good general resemblance but nothing identical was found. The closest were some sherds found with flint implements that have been equated *culturally* by Suliman Huzayyin with the Middle Predynastic of the West Bank in Egypt as represented from Nagʿ Hamâdi to Edfu. One of Shaw's sherds has been compared technically with representative Armant fragments in the table on p. 276A. It is shown on Pl. LXXIII, Figs. 2 and 3, No. 168. The same pottery was found only twice by Shaw and each time associated with the same flintwork. The remainder of the Libyan pottery was found associated with the polished stone axes, which Suliman Huzayyin thinks should be dated from 800 B.C. onwards, though Petrie dates them to the Old Kingdom or earlier at Koptos.

A visit was also paid to the Musée d'Ethnographie, at the Palais du Trocadéro, where Mr. Harper Kelley was exceptionally helpful. Here we were more fortunate, and found three groups of sherds indistinguishable from those from Armant.[1] Much material upon close examination was very similar indeed, but none of this was accepted as evidence of cultural connection. The sherds shown in Pl. LXXIV, Fig. 5, are such that when mixed with specimens from Armant they cannot be distinguished. This was tested by Fairman, who excavated the Armant settlement, numbered the sherds, and packed and unpacked them twice. There was no time for a proper physical comparative examination, but it will be seen on p. 272 that the colours, hardness, ware, and decoration all correspond. The positions of the settlements from which these sherds came are surprising. The batch, marked Sil., come from Siltou, and their *fundplatz* has been kindly given by M. Monod : " 16° 51′ 22″N et 15° 43′ 39″ E (Greenwich) d'aprés les travaux du Commandant Tilho (Cf. *La Géographie*, 1921, p. 307, et *Documents scientifiques Mission Tilho*)—au nord du Lac Tchad, dans l'Egnei, aux environs de la frontière Afrique Occidentale Française–Afrique Équatoriale Française." The site is marked on the 1:4,000,000 map of the Sahara by Capitaine G. Delingette, published by the Société d'Éditions Géographiques, Maritimes et Coloniales. The next batch, Tig., came from Tighammar whose position is not marked on this map. M. Monod gives it as follows : " 25° 43′ 4″ N et 4° 34′ 0″ E (Paris)—d'après les travaux de la Mission Foureau-Lamy (cf. *Doc. Scient. Mission Saharienne Foureau-Lamy*, I, p. 243, 317. etc.). Altitude : 960 m. Dans le massif Tinezzonatine, au sud du Tindesset. L'Oued Tighammar appartient au bassin (mediterranéen) de l'Igharghar." None of these places is marked on the above map. The third lot, Tag., came from Tabourareg, marked on the map at about 475 kilometres west of Timbuctoo by 100 kilometres north, about

[1] We are deeply indebted to Messieurs Paul Rivet, Georges Henri Rivière (Directeur et Sous-Directeur du Musée d'Ethnographie) and Mr. Harper Kelley for giving their kind permission to photograph and study these sherds, and, also to Monsieur Théodore Monod for facilities for the study of his recent collection.

2600 miles from Armant, as far as Malaga is from Nijni-Novgorod (Gorki). Tighammar is almost exactly on the same latitude as Luxor and the other two sites are south of this. Monsieur Monod showed me some sherds from his latest expedition, which resembled closely the type from Armant with dot patterns, but this was not so close that the wares could not be distinguished, so they have not been included for comparative purposes, since sherds from many parts of the Sahara and from the Sudan have been found as closely comparable.

There appears to be little doubt that all these sherds were associated in the Sahara with flints belonging to a Neolithic culture, but the date of this culture remains unknown. The supposition that it is A.D. may be safely disregarded, in view of the later cultures found in the same latitudes, associated with polished axes, which are tentatively dated to 800 B.C., onwards, and by Petrie to 3000 B.C.

There is no close parallel among Egyptian material. The general comparison with C-group and Meroitic has already been mentioned. The chevron or herring-bone pattern is fairly common in the Predynastic period, but this is too general to be of much help to us. A few of the sherds published by Brunton from Hierakonpolis (*op. cit.*) show an apparent relationship of pattern, but this is probably more akin to that on the *Chaff-ware* sherds (" R ") shown on Pl. LIV, Fig. 6, Nos. 15 and 16. Mr. Horner (*op. cit.*) unfortunately gives no illustration or accurate description of the pottery from a great depth in a boring near Cairo. Breasted (*op. cit.*) described wheel-made pottery from a depth of 80 ft. The probable explanation of both these occurrences is a shift in the position of the Nile bed, for when this occurs the old course fills rapidly with silt.

It will be seen that nothing definite about the date of the culture can be said until after further investigation. It is very much hoped to find the cemeteries attached to the settlement, in which case there should be little difficulty either in tying it in to known cultures or in deciding that it is of earlier date.

Description of the Wares.

One specimen of each class is described by Miss Billington in the table on p. 276A, and these are fair average samples of their type. The following list gives details of hardness, colour and decoration for the more important specimens, including the specimens from the Sahara, so that all points of comparison may be available. Mr. H. J. Braunholz was kind enough to help with the description of the decoration.

Sherd	*Moh.*	*Colour*	*Interior of Ware*		*Decoration.*
		Outs.	*Ins.*		
171/S	6	5lg	4nl	Bk.	Coating ?
172/S	5·5	5ni	4ng	,,	Coating in and out.
173/S	5	3pl	l	,,	Coating ?
174/S	c5	4pl	l	,,	Combed with wood comb with very low teeth and narrow interstices, or perhaps smoothed with grass stems bent over the palm of the hand. (1) Coating ?
175/S	c5	4lg	4ie	,,	Wood comb over surface and wood point for diamonds at top. Coating, outside burnished.
181/S	4	5ni	n	,,	Wood comb Coating outside *burnished.*
182/S	5·5	6pi	5·5pl	,,	,, ,, ,, ,, ,,
183/S	4	5ni	i	,,	,, ,, ,, ,, ,,
184/S	4	4lg	l	,,	,, ,, ,, ,, ,,
185/S	5·5	6pi	5pi	,,	,, ,, ,, ,, and inside *burnished.*

[1] Or possibly a crenellated shell.

Sherd	*Moh.*	*Colovr Outs.*	*Ins.*	*Interior of Ware*	*Decoration.*
189/S	4·5	5lg & n	i	Bk.	Rope pressed into the ware. Thin coating outside probably not burnished.
192/S	c6	5ni	l	,,	
194[1]/S	3	5lg	5lg	,,	Comb or perhaps spatula. Coating in and outside, burnished.
198/S	3	4ni	l	,,	Wood (?) point. No coating or burnish.
199/S	5·5	5lg	3nl	,,	,, ,, ,,
202/S	6	5lg	l	,,	,, ,, ,,
227/Tag.	3·5	4lg	3gl	,,	Scratched with a wood (?) point. It is difficult to decide if there was a coating or not. The abrupt change between the surface colours and the black body indicates that there was.
228/Tag.	4·5	2pl	2ig	,,	
229/Tag.	4	6·5pg	4ie	,,	
230/Tag.	3·5	4lg	3gt	,,	
231/Tag.	3	4lg	4le	,,	
232/Tag.	c5	4ni	3·5ni	,,	
233/S	5·5	5ng	5lg	,,	
234/S	c6	6pg & 16nl	5lg	,,	
235/S	5·5	4ni	5lg	,,	
236/S	3·5	3·5lg	3·5lg	,,	
237/S	c5	3hn	n	,,	
238/S	5·5	5lg	5ie	,,	
239/Tig.	6·5	5ni	4ie	,,	As above, but the coloured clay of the coating appears to have mixed with the other, as the colour occurs like accretions on the edges. The rim has been made by folding over the top.
240/Tig.	5·5	5ni	4le	,,	The same without the rim.
165/S	4·5	4ng	3nl	,,	Scratched with wood (?) point.
241/S	4·5	4ni	5lg	,,	,, ,, ,, ,, ,,
242/S	c5	4le	4le	,,	
243/S	c4	5ni	4ni	,,	
244/S	c5	3lg	3lg	,,	
245/Sil.	c7	4pn & 15pn	3li	,,	Impressed basket-work ?
246/S	4·5	6li & 7pi	g	,,	,, matting ?
247/Sil.	c5	6pl	6pl	6pl	Wood ? Point
248/S	4·5	4lg	4lg	Bk.	,, ,,
249/S	c6	6pl	6pl	6pl	

Some Physical Tests.

(In collaboration with Mr. C. A. Earnshaw.)

In attempting to describe any new or important pottery, the archæologist is hampered by the neglect of the technical side of this study. Form and decoration have generally been considered adequate for descriptive purposes (though Dr. Reisner has sometimes gone into details of ware and Mr. Lucas has carried out some interesting experiments). Even where further description is given it is not in such a precise form that the reader can compare a description scientifically with another pot. The technology of pottery is not yet taught in any of the archæological schools and archæology has made no use of the information available from potters and other ceramic experts. In describing the pottery of the Bucheum and environs an attempt was made to make the drawings more valuable by adding to them colour description and an indication of hardness. It became apparent, however, that these descriptions were inadequate and in various parts of this volume some tentative steps have been taken towards a scientific description of pottery (see especially pp. 177 ff). The Moh scale of hardness and the Ostwald colour album have been used for certain important pieces in this work. For the sherds of the Saharan culture some more detailed examination seemed advisable, side by side with some other wares, and for this purpose those already most closely described were chosen, together with one from Libya kindly lent by Mr. W. B. K. Shaw.

In addition to the descriptions of hardness and colour, analyses were obtained from Dr. H. E. Cox and from Professor Partington. Two other properties were examined, the " Apparent

[1] 194 to 197 have coating in and out, burnished, some red and some black.

Porosity " and the " Absorption Speed." Professor Andrade kindly allowed these experiments to be made in the laboratories at U.C.L. An account of these tests is given below. The sherds described were all photographed together (Pl. LXXIII, Figs. 2 and 3) and their numbers are given on the photographs.

In the table will be found a column giving the weights of the sherds at the beginning of the experiments, which, together with the photographs, gives an idea of their magnitude. A column will also be found for specific gravities. (see p. 276A).

Apparent Porosity.

Mr. B. Bakewell, of the Building Research Station, gives the following method of obtaining the " Apparent Porosity "[1] (the percentage by volume of the material which consists of pores connected with the surface) : " Place the dried and weighed specimens in a closed vessel provided with two tubes, each carrying a tap, evacuate the vessel by one tube for about an hour, close the tap, and admit previously boiled distilled water through the other. The specimens are allowed to stand under water for twenty-four hours before being weighed to determine the water absorption. The volumes are determined by weighing the saturated specimens suspended in water, If a high-vacuum pump is not available, a filter pump may be used for evacuation." The method used in the present tests varied slightly from this in the following particulars : the distilled water was not boiled ; soaking was carried on for sixteen and seventeen hours instead of the full twenty-four ; the percentage was determined by weight and later converted to volume by taking the specific gravity of each sherd. A high vacuum pump was used and, after the water had been let in, it was allowed to bubble until the air in solution was apparently exhausted, before letting air into the apparatus. After saturation, the sherds were dried with filter paper, to remove loose water adhering to the surface, and weighed on a watch glass. Both wet and dry weighings were taken to the nearest milligramme. It is probable that centigrammes would be sufficiently accurate for any future work on the same experiments.

All the specimens except 168/Libya lost weight during the experiments. The probable explanation of this is that they lost salts during saturation, whereas that from the Libyan desert, being free from any impurities, collected some of the salts which the water had dissolved out from the others. The changes were not such as to affect the accuracy of the experiments.

An interesting phenomenon occurred during the preparation of the sherds for the experiment. Two batches were examined. The first batch was well washed, soaked for two or three hours in tap-water, and dried in the sun to see if there were a large amount of salts, which if present in quantity would have appeared on the surface. No salts were visible under a lens and, in fact, the subsequent losses by weight were inconsiderable. It was not thought necessary to carry out the same preliminary test with the second batch, but, when three weighings were made, it was found that, in every sherd of this batch, the first weighing showed considerably less absorption of water than the subsequent two. A fourth experiment was made and a good concordance obtained with the two previous weighings, showing that the discrepancy arose because the sherds had not been washed first. The interest of this is that there was no loss of weight between the first and second dry weights, which might have shown that the difference could be accounted for by salts. It appears that the first wash and drying in some way opens the pores of the material, an effect that does not recur subsequently.

[1] In a letter to the authors.

It will be seen that the concordances are good for the apparent porosities, for, while each of these is the mean of three determinations the probable error is never greater than 1·5 per cent.

The last set of figures, referring to a novel test, requires more explanation. Practical potters in arriving at a conclusion about the manufacture of a pot, apply, amongst other tests, that of licking the sherd and noticing how long the liquid takes to soak into the surface. The " Absorption Speeds " represent an endeavour to place this test on a scientific basis.

The apparatus used was of the simplest, consisting of a burette and a stop-watch. The sherd, after drying in an oven and cooling in a dessicator, was placed under the burette and a drop of water allowed to fall upon it. The stop-watch was started as the drop fell on the sherd and stopped when all water had disappeared from the surface. The latter point can be satisfactorily judged because water on the surface gives a glaze from which light is reflected and the moment of disappearance of this glaze can be observed with accuracy. The shorter the period of time involved in the disappearance of the drop, the finer the end-point. The sizes of the drops were tested for uniformity by weighing five, which gave a mean weight of 33·2 ± 0·3 mg., a probable error of less than 1 per cent. The slight delay between observation of the phenomenon of the drop impinging on the sherd and the starting of the mechanism of the watch is naturally counterbalanced by the same delay at the end of the phenomenon. Without very elaborate tests it would not be possible to state accurately the error in recording the time, but this was undoubtedly too slight to be a serious factor. A rough test was made by timing with one watch a revolution of one minute on another and in no case was the error more than one-tenth of a second. This error remains constant and could only affect the results in the shortest times, i.e. those under one second.

The sherds were tested on their outer and inner faces and on their edges, the latter giving the least reliable results because there was a tendency on the part of the drop to flow over the edge of the sherd. Unless otherwise stated, the edge readings were taken on old breaks.

The probable errors are a little on the high side, though it must be remembered that they are from three determinations only. Those of two edge readings, from Nos. 165 and 167 are over 20 per cent, and these results would have to be ignored for practical purposes. Those of the readings for the inside of 160, the outside of 165, and the outside of 169, are all 1 per cent or under, but these are unusually low, the average figure being about 8 per cent, which is satisfactory for this type of experiment. The mean absorption speeds of three drops on new and old filter paper were 4·67 ± ·09 (2 per cent error), and 8·6 ± ·5 (6 per cent error) respectively.

The table below shows the results of these experiments together with as complete a description as possible of the sherds used, illustrations of which are given on Pl. LXXIII, Fig. 2 and 3. Miss Billington kindly consented to give an estimated firing temperature without reference to the experimental results.

It is clear that the experiments deal with too few sherds, and those too varied for any very definite conclusions to be drawn from them. But they serve to clear the ground for further work, to eliminate a number of possibilities in mind when they were begun, and to suggest others.

Apparent porosity must be affected by composition, firing temperature, and method of manufacture. The difficulty is in isolating these factors, all of which are unknown at the beginning of the experiments. Some elimination of factors can be made here, by reason of the analyses given, but this can only be tentative until research has been carried out on many more

specimens, so that concordances can be examined. At present, it appears that neither apparent porosity nor absorption speed are affected by composition alone, certainly not the latter. It is quite clear that firing temperature alone does not affect the absorption speed since the same sherd, 169, gives enormously differing speeds for different surfaces, and this phenomenon is noticeable to a lesser degree in other specimens. It is probable that the same applies to composition since on the above sherd the original coating had disappeared and the matter appeared to be homogenous. A difficulty is encountered here, however, for the experiments show that exposure alters the surface of a sherd considerably. This can be seen from the different readings on fresh and old breaks. Both Mr. Brunton and M. Monod have commented to me on the fact that portions of sherds exposed for a period to the weather, appear to be harder than those not so exposed. These experiments show that a crust of some sort is formed, and tests on some pottery from the Libyan Desert prove the crust to be harder than the original surface. Is this crust deposited silica ? It may be possible in the future to prove this by analysis.

The lack of concordance between apparent porosity and absorption speed might be narrowed if sherds were tested for the former with the broken edges coated with a waterproof material, but it is quite possible that the speed with which liquid is absorbed and the total amount which can be absorbed bear little or no relation to each other. For most domestic purposes it is the former which is of the greater importance, especially if the speed be very slow.

There can be little doubt that the absorption speed is finally governed by the method of finishing the surface, for in specimen 161 there was no crust (though there was a burnished coating on the outside).

Samples 160 and 169 seem to show a connection between hardness and absorption speed, which is not, however, confirmed altogether by the other specimens.

The concordances between different samples of the same pottery are not satisfactory, but there are too few specimens as yet to deliver judgment upon them. If, as appears probable, the absorption speed is governed by the finish of the surface, sherds 166 and 167 which have similar surfaces might be expected to give closely comparable results, but, though this is so on the inner surface, it does not apply to the outer. The apparent porosities agree very closely.

Some rough and ready tests with some modern pottery of known (approximate) firing temperatures were not without interest. A large jar, glazed on the inside, and said to be fired at about 1200°C gave about ½ minute only on the unglazed outside surface. A similar platter varied under the under-surface between ¼ minute and ½ minute, with a mean of 22 seconds ± 1 second. The time for subsequent drops on the place of one, which took ¼ minute, increased to ½ minute, and various experiments showed a curious progression which needs further investigation. A similar series of tests needs to be done accurately on an ancient pot to establish the variation, and when Miss Billington has a sufficient number of specimens of the same composition fired at different temperatures, and of different composition fired at the same temperature, it will be possible, with her collaboration, and that of Mr. Lucas, to make rapid progress in assessing the usefulness and application of these tests. Shortage of time prevented us from making more than preliminary experiments.

Mr. Bakewell, of the Building Research Station, has kindly supplied the following notes which will be of value in future work :

" The theory of porosity determination has been worked out in some detail in a series of

papers by E. W. Washburn and co-workers published in the journal of the American Ceramic Society in 1921 and 1922.

" We are inclined to think that you will not find porosity a very reliable guide to firing temperature. Although, in general, the porosity of a clay body decreases as the temperature of firing increases (there are exceptions to this rule), it is not possible to determine firing temperature from porosity unless a great deal is known about the particular clay which has been used, because different clays fired at the same temperature will have very different porosities.

" A possible method would be to refire portions of the pottery in question to various temperatures, the porosity being measured before and after. The theory is that until the original firing temperature is reached, no change in porosity will occur, but above that temperature a decrease in pore space will be found. In practice, however, it is probable that the results would be uncertain and difficult to interpret, due partly to the absorption of salts, organic matter, etc., during the ages."

The greater part of the material has been retained for further investigation, but the following distribution has been made. The pieces from the Sahara and Libya remain, of course, in the hands of their owners. The material from Armant on Pl. LXXIV, Fig. 4, Nos. 228–249, has been presented to the Trocadèro Museum, together with some unfigured examples of the ware with dot patterns. The remainder of the figured material, excepting specimens destroyed in analysis, has been sent to the Manchester Museum. Representative samples of the wares are at the Egyptian Museum, Cairo, the University Museum, Cairo, the British Museum (Dept. of Ethnography, Nos. 1935/10–19, 1–14), and the Queen's College, Oxford.

O. H. M. & C. A. E.

Analysis of " Saharan " Sherds.

By Dr. H. E. Cox.

I have analysed the small specimens of Sherds which you sent me on the 1st instant. One was dark and the other a lighter colour—decorated. It was noticed in the grinding that the second sample was softer than the first, possibly because it has a rather larger proportion of carbonate of lime. The analytical results are as follows :

	196/S	*166/S*
Loss on Ignition (mainly CO_2)	3·3%	6·9%
Silica	57·2%	52·1%
Iron oxide	8·5%	10·0%
Aluminium oxide	28·0%	18·7%
Calcium oxide	3·8%	10·3%
Magnesia	Trace	Trace
Manganese oxide	Trace	Trace

Analysis of Sherds.

By Professor J. R. Partington.

Notes.

I have analysed four of the six samples of pottery, and the results are given below. They are all normal, by comparison with some analyses of Brongniart, who was Director at Sèvres and knew a great deal about pottery chemistry. I regret that the loss on ignition

COMPARISON OF PHYSICAL PROPERTIES OF DIFFERENT PREDYNASTIC AND SAHARAN SHERDS

No. and Fundplatz	*Type* (Petrie)	*Ware* (See pp. 49ff)	*Description* By Miss Billington. (See p 271)	*Estimated Firing Temp.* (In degrees Centigrade)	*Colour* By J. Scott-Taylor. (See p. 186)	*Percentage Composition* By Dr. H. E. Cox and Prof. Partington						*Hardness* (Moh scale)	*Specific Gravity*	*Individual Weight* (Grammes)	*Apparent Porosity*		*Absorption Speed* (Seconds)			*Remarks*
						SiO_2	MgO & MnO	Fe_2O_3	Al_2O_3*	Loss on Ignition (CO_2)	CaO				Percentage by Weight	Percentage by Volume	Outside	Inside	Edge	
160/I F 3	'R'	*Chaff*	Badly pugged clay with added chaff. Thoroughly fired.	c 800	4ni Inside 4nl Outside	63·08	2·45	27·95		(c 3)	3·38	2·5	2·61	13·750	26·3 ± ·01	68·6 ± ·03	3·2[4] ± ·3	1·9 ± ·01	{ 0·63[2] ± ·02 1·6 ± ·1 }	Small figure at top right corner of absorption speed figure shows number of determinations. If no figure, 3 determinations is to be understood.
161/III L 7	'S.B.'	*Nile*	Close, compact clay, not very well pugged. Quickly fired. Well burnished on outside.	c 600 to 700	3·5kf Outside	57·5		23·4			5·2	3·5–4	2·71	11·444	19·2 ± ·02	52·0 ± ·05	57 ± 3	{ 12·4[2] ± ·03 48[2] ± 6 }	1·7 ± ·1	Lower reading for inside and edge-reading on new breaks. Old edge gave a reading of 32.
162/1,100	'D'	*Desert*	Compact sandy clay, thoroughly fired.	c 1150	3fd Outside mk Decoration 3fd Inside	50·0		32·2			14·0	4	2·46	17·152	20·1 ± ·01	49·4 ± ·02	1020 ± 56	838 ± 52	140 ± 13	An outside reading of 502 on a crack, and an inside reading of 160 when the drop spread very widely.
163/I F 3	'D'	*Desert*	Compact, sandy clay, thoroughly fired.	c 1050	3gc Outside 6lg Decoration 3·5hd Inside	54·9		35·5			7·8	2·5–3	2·45	9·503	20·7 ± ·01	50·7 ± ·02	40 ± 5	53 ± 5	45 ± 4	
164/Ar. x	'B'	*Nile*	Compact, well-washed and well fired. Burnished in and out on coating.	c 1050	1n Outside n Inside	62·03	2·03	26·26		3·77	3·71	3·5–4	2·73	1·622	13·5 ± ·02	36·9 ± ·05	108 ± 7	74 ± 11	60 ± 1	
165/S.	—	Not classified	'Saharan.' Chevron pattern. Coating on outside. Compact clay. Partially vitrified; this due to reducing atmosphere or peculiarity of the clay.	c 1150	4ng Outside 3nl Inside	NOT ANALYSED						4·5	2·60	3·751	16·0 ± ·01	41·6 ± ·03	445 ± 4	100[4] ± 10	83 ± 15	
166/S.	—	Not classified	'Saharan.' Dot pattern. Burnished coating in and out. Same ware as above but better finished.	c 1150	5ni Outside 5pl Inside	52·1	Tr.	10·0	18·7	6·9	10·3	4·5	2·66	3·941	13·1 ± ·01	34·8 ± ·03	390 ± 30	1520 ± 220	{ 150[2] ± 40 23[1] }	The lower edge-reading on a new break.
167/S.	—	Not classified	'Saharan.' Dot pattern. Burnished coating in and out. Same as above.	c 1150	5pl Outside 5pl Inside	NOT ANALYSED						4·5	2·58	7·453	13·2 ± ·01	34·1 ± ·03	1900 ± 140	1320 ± 20	60 ± 14	
168/Libyan Km. 5980	—	Not classified	Libyan. Dot pattern (Neolithic). Sandy clay, well prepared. No coating and apparently unburnished.	c 1000	4lg Outside 4pn Inside	61·55	1·07	9·47	22·07	3·49	1·63	3–3·5	2·69	6·087	15·4 ± ·02	41·4 ± ·05	568 ± 17	213 ± 29	212 ± 10	
169/S.	—	Not classified	'Saharan' Plain. Much grit and perhaps some chaff. Badly prepared. Stoneware, greatly vitrified.	1200 to 1250	3pn Outside 3pn Inside	57·2	Tr.	8·5	28·0	3·3	3·8	Circa 7	2·59	9·599	13·1 ± ·015	33·9 ± ·04	2710 ± 47	870 ± 170	1·0 ± ·1	The figure for the edge is on a new break. The old break gave 711. An outside reading where some coating remained was about 7200 (2 hrs.)
170/I K 14 (Not in photograph)	'P'	*Nile*	Burnished coating on outside only. Ware similar to 164.	c 1000	6ni Outside 4lg Inside	63·55	2·55	26·79		0·97	4·00	2·5	—	NOT DETERMINED —	—	—	164 ± 14	11·4 ± ·4	2·5 ± ·3	Inside without coating and unpolished.
Filter paper { Old / New																	8·6 ± ·5 4·67 ± ·09			The old piece had been wetted and dried in oven and desiccator.

* When a single figure is given the alumina and ferric oxide were determined jointly.

COMPARISON OF PHYSICAL PROPERTIES OF DIFFERENT PREDYNASTIC AND SAHARAN SHERDS

nd Fundplatz	*Type* (Petrie)	*Ware* (See pp. 49ff)	*Description* By Miss Billington. (See p 271)	*Estimated Firing Temp.* (In degrees Centigrade)	*Colour* By J. Scott-Taylor. (See p. 186)	*Percentage Composition* By Dr. H. E. Cox and Prof. Partington						*Hardness* (Moh scale)	*Specific Gravity*	*Individual Weight* (Grammes)	*Apparent Porosity*		*Absorption Speed* (Seconds)			
						SiO_2	MnO	Mg.O & Fe_2O_3	Al_2O_3*	Loss on Ignition (CO_2)	CaO				Percentage by Weight	Percentage by Volume	Outside	Inside	Edge	
F 3	'R'	*Chaff*	Badly pugged clay with added chaff. Thoroughly fired.	c 800	4ni Inside 4nl Outside	63·08	2·45	27·95		(c 3)	3·38	2·5	2·61	13·750	26·3 ± ·01	68·6 ± ·03	$3·2^4$ ± ·3	1·9 ± ·01	$\{0·65^2 \pm ·02$ $1·6 \pm ·1\}$	Small figu speed f tions. be und
II L 7	'S.B.'	*Nile*	Close, compact clay, not very well pugged. Quickly fired. Well burnished on outside.	c 600 to 700	3·5kf Outside	57·5		23·4			5·2	3·5–4	2·71	11·444	19·2 ± ·02	52·0 ± ·05	57 ± 3	$\{12·4^2 \pm ·03$ $48^2 \pm 6\}$	1·7 ± ·1	Lower re on new of 32.
,100	'D'	*Desert*	Compact sandy clay, thoroughly fired.	c 1150	3fd Outside mk Decoration 3fd Inside	50·0		32·2			14·0	4	2·46	17·152	20·1 ± ·01	49·4 ± ·02	1020 ± 56	838 ± 52	140 ± 13	An outsid an insi spread
F 3	'D'	*Desert*	Compact, sandy clay, thoroughly fired.	c 1050	3gc Outside 6lg Decoration 3·5hd Inside	54·9		35·5			7·8	2·5–3	2·45	9·503	20·7 ± ·01	50·7 ± ·02	40 ± 5	53 ± 5	45 ± 4	
r. x	'B'	*Nile*	Compact, well-washed and well fired. Burnished in and out on coating.	c 1050	ln Outside n Inside	62·03	2·03	26·26		3·77	3·71	3·5–4	2·73	1·622	13·5 ± ·02	36·9 ± ·05	108 ± 7	74 ± 11	60 ± 1	
.	—	Not classified	'Saharan.' Chevron pattern. Coating on outside. Compact clay. Partially vitrified; this due to reducing atmosphere or peculiarity of the clay.	c 1150	4ng Outside 3nl Inside	NOT ANALYSED						4·5	2·60	3·751	16·0 ± ·01	41·6 ± ·03	445 ± 4	100^4 ± 10	83 ± 15	
.	—	Not classified	'Saharan.' Dot pattern. Burnished coating in and out. Same ware as above but better finished.	c 1150	5ni Outside 5pi Inside	52·1	Tr.	10·0	18·7	6·9	10·3	4·5	2·66	3·941	13·1 ± ·01	34·8 ± ·03	390 ± 30	1520 ± 220	$\{150^2 \pm 40$ $23^1\}$	The lowe
.	—	Not classified	'Saharan.' Dot pattern. Burnished coating in and out. Same as above.	c 1150	5pl Outside 5pi Inside	NOT ANALYSED						4·5	2·58	7·453	13·2 ± ·01	34·1 ± ·03	1900 ± 140	1320 ± 20	60 ± 14	
Libyan Km. 5980	—	Not classified	Libyan. Dot pattern (Neolithic). Sandy clay, well prepared. No coating and apparently unburnished.	c 1000	4lg Outside 4pn Inside	61·55	1·07	9·47	22·07	3·49	1·63	3–3·5	2·69	6·087	15·4 ± ·02	41·4 ± ·05	568 ± 17	213 ± 29	212 ± 10	
.	—	Not classified	'Saharan' Plain. Much grit and perhaps some chaff. Badly prepared. Stoneware, greatly vitrified.	1200 to 1250	3pn Outside 3pn Inside	57·2	Tr.	8·5	28·0	3·3	3·8	Circa 7	2·59	9·599	13·1 ± ·015	33·9 ± ·04	2710 ± 47	870 ± 170	1·0 ± ·1	The figur The o reading was ab
K 14 in photograph)	'P'	*Nile*	Burnished coating on outside only. Ware similar to 164.	c 1000	6ni Outside 4lg Inside	63·55	2·55	26·79		0·97	4·00	2·5	—	NOT DETERMINED —	—	—	164 ± 14	11·4 ± ·4	2·5 ± ·3	Inside wi
paper { Old New																	8·6 ± ·5 4·67 ± ·09			The old in oven

When a single figure is given the alumina and ferric oxide were determined jointly.

OF PHYSICAL PROPERTIES OF DIFFERENT PREDYNASTIC AND SAHARAN SHERDS

imated g Temp. (degrees tigrade)	*Colour* By J. Scott-Taylor. (See p. 186)	*Percentage Composition* By Dr. H. E. Cox and Prof. Partington SiO_2	Mg.O & MnO	Fe_2O_3	Al_2O_3*	Loss on Ignition (CO_2)	CaO	*Hardness* (Moh scale)	*Specific Gravity*	*Individual Weight* (Grammes)	*Apparent Porosity* Percentage by Weight	Percentage by Volume	*Absorption Speed* (Seconds) Outside	Inside	Edge	*Remarks*
800	4ni Inside 4nl Outside	63·08	2·45	27·95		(c 3)	3·38	2·5	2·61	13·750	26·3 ± ·01	68·6 ± ·03	$3·2^4$ ± ·3	1·9 ± ·01	$\{0·65^2 \pm ·02$ $1·6 \pm ·1\}$	Small figure at top right corner of absorption speed figure shows number of determinations. If no figure, 3 determinations is to be understood.
600 to 700	3·5kf Outside	57·5		23·4			5·2	3·5–4	2·71	11·444	19·2 ± ·02	52·0 ± ·05	57 ± 3	$\{12·4^2 \pm ·03$ $48^2 \pm 6\}$	1·7 ± ·1	Lower reading for inside and edge-reading on new breaks. Old edge gave a reading of 32.
1150	3fd Outside mk Decoration 3fd Inside	50·0		32·2			14·0	4	2·46	17·152	20·1 ± ·01	49·4 ± ·02	1020 ± 56	838 ± 52	140 ± 13	An outside reading of 502 on a crack, and an inside reading of 160 when the drop spread very widely.
1050	3gc Outside 6lg Decoration 3·5hd Inside	54·9		35·5			7·8	2·5–3	2·45	9·503	20·7 ± ·01	50·7 ± ·02	40 ± 5	53 ± 5	45 ± 4	
1050	ln Outside n Inside	62·03	2·03	26·26		3·77	3·71	3·5–4	2·73	1·622	13·5 ± ·02	36·9 ± ·05	108 ± 7	74 ± 11	60 ± 1	
1150	4ng Outside 3nl Inside	NOT ANALYSED						4·5	2·60	3·751	16·0 ± ·01	41·6 ± ·03	445 ± 4	100^4 ± 10	83 ± 15	
1150	5ni Outside 5pi Inside	52·1	Tr.	10·0	18·7	6·9	10·3	4·5	2·66	3·941	13·1 ± ·01	34·8 ± ·03	390 ± 30	1520 ± 220	$\{150^2 \pm 40$ $23^1\}$	The lower edge-reading on a new break.
1150	5pl Outside 5pi Inside	NOT ANALYSED						4·5	2·58	7·453	13·2 ± ·01	34·1 ± ·03	1900 ± 140	1320 ± 20	60 ± 14	
1000	4lg Outside 4pn Inside	61·55	1·07	9·47	22·07	3·49	1·63	3–3·5	2·69	6·087	15·4 ± ·02	41·4 ± ·05	568 ± 17	213 ± 29	212 ± 10	
1200 to 1250	3pn Outside 3pn Inside	57·2	Tr.	8·5	28·0	3·3	3·8	Circa 7	2·59	9·599	13·1 ± ·015	33·9 ± ·04	2710 ± 47	870 ± 170	1·0 ± ·1	The figure for the edge is on a new break. The old break gave 711. An outside reading where some coating remained was about 7200 (2 hrs.)
1000	6ni Outside 4lg Inside	63·55	2·55		26·79	0·97	4·00	2·5	NOT DETERMINED —	—	—	—	164 ± 14 8·6 ± ·5 4·67 ± ·09	11·4 ± ·4	2·5 ± ·3	Inside without coating and unpolished. The old piece had been wetted and dried in oven and desiccator.

of No. 160 was not done, but the results show that it would probably be about 3 per cent. The totals are quite satisfactory for this type of work; a little alkali may account for part of the small difference from 100.

The black coating on No. 164 contains an appreciable amount of magnetic oxide of iron, but the loss on ignition indicates that some carbon is also present. Since I could only risk taking off a milligramme or two without disturbing the total composition, I could not make a quantitative analysis of the black itself.

Method.

Silicate fusion. SiO_2 and $Al_2O_3 + Fe_2O_3$ weighed as such. In 168, Al_2O_3 separated by caustic soda fusion, Fe_2O_3 reprecipitated with ammonia and weighed as such. Ca volumetrically as oxalate. Mg gravimetrically as pyrophosphate. All samples dried at 125–130° in powder before weighing.

Results	*160*	*164*	*168*	*170*
	%	%	%	%
Silica (SiO_2)	63·08	62·03	61·55	63·55
Alumina (Al_2O_3) ... ... }	27·95	26·26	22·07	26·79
Ferric oxide (Fe_2O_3) ... ... }			9·47	
Lime (CaO)	3·38	3·71	1·63	4·00
Magnesia (MgO)	2·45	2·03	1·07	2·55
Loss on ignition	—	3·77	3·49	0·97
Total dtmd.	96·86	97·80	99·28	97·86

J. R. P.

Addendum

We have just had the opportunity of examining the objects from an extremely interesting burial, No. 4, found by Shaw about 300 miles west-south-west of Wadi Halfa. They are of almost normal Predynastic Egyptian type and there can be little doubt that the burial belongs to that culture. The burial will shortly be published with full technical details.

Though it shows activity in the Western Desert during the Predynastic period, by the same peoples that were in the Nile Valley, it does not in any way affect the suggestions about the Armant " Saharan culture " put forward above. Ed.

Specimens from the Fish Pit.

From The Director, Zoological Gardens, Giza, Egypt.

The specimens have been examined and found to be most probably " Cat fish " (*Clarias Lazera*).

CHAPTER XVIII

A NEW POTTERY

A SHORT description is added here of some sherds found by Fairman while digging the " Saharan " settlements.

The sherds were brought in by the workmen from a site which has been marked down for excavation. They are obviously sherds from a robbed cemetery and not from a settlement. Unfortunately the cemetery is much disturbed by Roman graves and the results of excavation are problematical.

It would be premature to give more than the briefest description of the sherds which are well represented on Pl. LXXIV, Nos. 250 to 264. The outside of the bowls to which the sherds belonged were of various shades of brown, mottled with uneven firing, the insides black, shading off to brown at the rims. The commonest decoration, that of Nos. 250–253, is made by impressing a comb or similar instrument, and this graduates through the second commonest type, sherds 254–261, where the comb is slightly dragged, to 262 and 263, where the dragging has been extended to produce an effect almost identical with the Badarian ripple. Most of the sherds show burnish on the outside, and where this is absent it has probably been weathered away. The hardness has a wide range, from about 3 to 5·5. The absorption speed (tested with unmeasured drops only) is probably about 600 on the burnished surface. The ware is fine and free from grit and has added chaff in only three out of thirty-five fragments.

In Nubia, the ripple occurs at various periods and it seems, therefore, unsafe in Upper Egpyt to build a hypothesis on the evolution of this feature in the few examples we have, though in Middle Egypt and Lower Egypt it might point to a " Proto-Badarian " culture. In any case it is probable that it is early.

Addendum. The pottery belonged to a Nubian people living in Egypt in the late Proto-dynastic or early Archaic periods. The results of excavation will be published later.

O. H. M.

CHAPTER XIX

OSTRAKA

THE following ostraka were submitted to the late Professor Hunt and were in some way overlooked during the publication of *The Bucheum*. They came to light after his death. Mr. T. C. Skeat has kindly described the Greek, and Mr. Glanville the Demotic and Coptic. All the ostraka are Roman unless otherwise stated.

REGISTER OF GREEK OSTRAKA.

Nos.	*Fundplatz*	*Material*	*Description*	*Translation*	*Museum Nos.*
227	Baq. R.	T.C. 88	Σαραπίω[ν	" Sarapion "	B.M. 63960
228	214[1]	T.C.	Ἡρακλείου ῥήτορο[ς	" Heraclius (?) the advocate ["	,, 63961
205	Baq. R.	T.C. 88	Δρ . . . . [		,, 63940
206	,, ,,	T.C.	Illegible		,, 63941
207	,, ,,	T.C. 88	Φιλ ( )	" Phil ( ) "	,, 63942
208	,, ,,	,, ,,	Ὧρος Πετοβ ( )	" Horus son of Petob . . ( ) "	,, 63943
209	Lost	,, ,, ?	Κλέων	" Kleon "	,, 63944
210	Baq. R.	T.C..88	Σερ⟨α⟩πι ( )	" Serapion (?) "	,, 63945
211	,, ,,	,, ,, ?	Illegible		,, 63946
212	,, ,,	T.C.	Illegible		,, 63947
213	,, ,,	,,	Illegible		,, 63948
214	,, ,,	,, with white coating	Account (?)		,, 63949
215	,, ,,	T.C.	Account (see below)		,, 63950
216	,, ,,	,,	Money Account		,, 63951
217	,, ,,	,,	Illegible		,, 63952
218	,, ,,	,,	Account of wine (?), mentioning Haraus son of Karouris and Hereaius		,, 63953
219	,, ,,	T.C. with white coating	List of names (?)		,, 63954
220	,, ,,	T.C.	Account		,, 63955
221	,, ,,		Money account, mentioning Horion and Didymus (?)		,, 63956

[1] Some details of this tomb were published in *J. E. A.* 1931, November, pp. 223-232.

215 is some kind of account (3rd cent. A.D.) mentioning the Bucheum by name. It is quite uncertain how it comes to be mentioned. I have shown it to Bell, who was unable

to do more than confirm the fact that the Bucheum is mentioned. The transcript is as follows :

] ϵ
]...ας //α
]Βουχίου α
].εις παπγελϵ ϵ
]μικρον ϵ
]μϵ...α

(The only other classical mention of the Bucheum by name occurs on a Greek mummy ticket translated in *The Bucheum*, II, 27.)

Register of Demotic and Coptic Ostraka.

	Nos.	*Fundplatz*	*Material*	*Description*	*Museum Nos.*
Demotic	223	Buch x.	T.C.	Illegible (Frag. account ?)	B.M. Not yet allotted
	224	Baq. R.	,,	School exercise ?	,, 63958
	225	,, ,,	,,	Illegible	,, 63959
	226	Buch x.	,,	Fragments of account very similar to 30 (*The Bucheum*, I, 153–164a, and II, 57–63)	,, Not yet allotted
Coptic	222	Baq. R.	T.C. 88 ?	Six lines of a letter	B.M. 63957

CHAPTER XX

SOME COPTIC MANUSCRIPTS

By Rev. de Lacy O'Leary

(The Coptic Manuscripts kindly examined for us and described below by the Rev. de Lacy O'Leary were bought in Luxor from a dealer, to save them from destruction. The dealer was tearing them up and selling the sheets separately to tourists at 10 piastres a time—to their mutual disgrace. All these fragments are in Bohairic.

We heard from more than one quarter that these manuscripts came from a Coptic Monastery on the concession, but too much credence cannot be placed on such a report. It is possible that they were throw-outs from the occupied Monastery of St. George (Deir el Mari Guirgis). They are now in the possession of the Wellcome Historical Medical Museum. Ed.).

SUMMARY LISTS OF MSS.

1. 29 pages (or fragments) of *Katameros* (book of daily lessons) : script akin to that in Hyvernat, *Album*, lvi. 3. dated 1531) : includes lessons for 29 Kihak (Nativity of Christ), " evening psalm " for St. Victor (of Assiût ?,—5 Kihak = 1 December), lessons for Tubeh (December-Jan.), preparation for Easter, etc.

... Mat. 1. 10-17 : Ps. 75. 3 : Mat. 1. 18-
115 Mat. 3. 5-12 : Ps. 28. 3.
... Mat. 3. 11-17.
... Ps. : Mat. 10. 16-22.
... Mat. 13. 31-43.
... Mat. 15. 23-28 : Rom. 4.
... Luke 12. 28-31 : Ps. 30. 25 : Mat. 22. 1-5.
(3 consecutive folios) Ps. 115, 6-7 : Mark 13. 9-13 : 2 Tim. 2. 1-8 : 1 Peter 4. 12 : Acts 19 : Ps. 11. 4-8 : Luke 12. 4-8.
... Ps. 33. 20 : Mark 8. 34-9. 1.
... Luke 1. 41-55.
[102] 103 (2 consec.) Ps. 71. 10 : Luke 3. 23-28.
[29 Kihak, Nativity of Christ] Ps. 71. 15.
... Ps. : Luke 10. 11-20.
... Ps. : Luke 11. 20-21.
... Luke 12. 8- : 1 Cor. 10 : 1 Peter 4.
... John 1. 14-17 : Heb. 1.
[2 folios] Ps. : John 10. 22-38.
... 2 Cor. 11. 17 : 1 Peter 2 : Acts 6. 8-
... Acts 7. 35- : 1 John 2.
... 1 Cor. 1 : 1 Peter 2. 11 : Acts 10. 34-
... Heb. 1 : Jude 9 : Acts 10.
... Acts 22. 14-28.
... Mat. 20. 9-16 : 2 Cor. 6. 2-
... 1 John 4. 5-14 : Acts 13. 13-
... 2 John 5.
124 Heb. 9 : 2 John.

2. 45 pages of *Katameros* (see above), some numbered. One noted for St. Mercurius (25 Hator = 21 November), one for " the Fast." Script rather later than preceding :

7 John 5. 11-18.
20 [21] Rom. 14. 22-2 : James 1. 21-24 : Acts 23. 1- : Psalm 94. 8.
24 Luke 4. 2-
33 Mat. 28. 8-16 : 2 Cor. 6. 2. [same lessons in No. 1.]
34 [35] Luke 15. 17-32.
39 Mat. 6. 2-10.
41 Mat. 22. 7-14.
44 Acts 25. 13 : Psalm.

47 John 4. 15-23.
[54] 55, 56 Mat. 21. 23-46 : 2 Thes. 2. 2 : 2 Peter 3. 1-4 : Acts 26. 19-23.
59 John 5. 3-11.
64, 65, 66 ... [S. Mercurius]. Psalm 67. 36 : Luke 12. 2-12.
76, 77 1 Peter 4. 1 : Acts 28. 9.
79 Mat. 21. 6-12.
... Mat. 15. 6-15.
... Ps. : Mat. 21. 28-31.
... Mat. 23. 16-23.
... Mat. 23 35-39 : Colos. 3. 5- .
... Ps. 50. 1 : Mark 1. 12-14. [Ornamental heading.]
... Mark 11. 1-8.
... Luke 13. 31-35 : Ps. 101 : [Gosp. Mat. . . .]
... [2 pages] Luke 19. 31-48.
... John 4. 31-38.
... [2 pages] John 9. 6-18.
... [2 pages] John 9. 30-41 : Ps. : [Luke ?] Mark 8. 32.
... John 12. 3-11.
... [2 pages] Ps. : John 12. 12-19. [rubrics.]
... Acts 27. 27. . . .
... [2 pages] 2 Cor. 11. 25-28 : 1 Peter 3. 7 : Acts 24. 1-
... Ephes. 6. - 7 : James 4. 7- : Acts . . .
... 2 Thes. 2. : 2 Peter 3.
... [frag.] Luke 13. 26-30.
... [frag.] 2 John 8. 12.

3. Fragment of *Katameros*. [Luke] —late date, bad condition.
4. 1 frag. of *Katameros*. . . . Luke 19. 11-14.
5. 1 frag. of *Katameros*, numbered 158. Coptic with Arabic translation. Luke 15. 8-10.
6. 5 fragments of *Ketameros*, late date.
Ps. : Mat. 3. 1- : — Ps. : Mark 1. 1- : Mark 1. 6-11 : Luke 1. 11-13, Luke 1. 13-16.

7. 66 pages from *Kitāb al-Laqān*, special services for certain feasts. Printed edition. Cairo, 1921. First page numbered 61. Coptic text, Arabic at the side :
29 pages of the *Blessing of the Waters on Epiphany* (printed ed. 7-59).
27 pages of *Foot Washing on Maundy Thursday* (printed ed. 60-130).
10 pages of *Service for SS. Peter and Paul* (printed ed. 131-189.

8. 39 pages from *Kitāb al-Laqān*. Coptic text with Arabic translation following. Last page (numbered 59) contains beginning of " Blessing of the Waters on Epiphany " (*cf.* above).
19 pages, *First Prostration on Pentecost*. (printed ed. 228-267).
11 pages, *Second Prostration on Pentecost*. (printed ed. 268-292). [Beginning of this service is on one of the pages shewn at exhibition.]
9 pages, *Third Prostration on Pentecost*. (printed ed. 293-326.)

9. One page from different volume. Frag. of *Blessing of the Waters on Epiphany*. (*cf.* No. 7.)

10. Two consecutive pages from *First Prostration on Pentecost*. (*cf.* No. 8.)

11. *Theotokia*, hymns, especially hymns to B. V. Mary arranged for the days of the week. Collection of 19 (22) leaves bound together like a book : not all from the same source, not in correct order, some reversed, some upside down, six stuck together to make three (hence 19 pages out of 22). Those marked (*) apparently from same source :

*1-4. *Psali*, or hymn.
*5. Sunday Theotokia VII.
6. Sunday Th. part of VI, paraphrase, and secondary paraphrase.
7. Prayer for Office for the Eleventh Hour.
*8-9. Concl. of *Psali* ; beginning of *Psali* before Sunday Theotokia.
*10 (11). Two folios stuck together, reversed. 10. First 4 verses of Psali (same as 8 ?), 11 ?.
*12. End of Friday Theotokia ; beginning of *Psali* for Saturday.
13. As Theotokia (1908 printed edit., Cairo) pp. *T* line 6—*TA* line 15.
*14-15. (Upside down) Monday Th. IV-VIII.
16. Theotokia, to follow p. 13 above.
17-18. (Upside down) Sunday Th. II. with paraphrase, secondary paraphrase.
19 (20). Two pp. stuck together, reversed.
*21 (22). Sunday Th. VIII., paraphrase : Gloria in Excelsis.

12. *Theotokia*. 18 pages, loose : from same source as those marked (*) in No. 11 :

1. to follow 4 of No. 11.
2. part of Ode II (Psalm 135.)
3. Tuesday Th. V-VI.
4. Wednesday Th. III-IV.
5. Wednesday Th. V-VI.
6. Saturday Th. V and " repeater."
7. Saturday VII and " repeater."

The following are bound together, in correct order :
8-18. Saturday X, " repeater," prayers, etc., following : ⲧⲉⲛⲟⲩⲱϣⲧ etc.

13. *Theotokia*, 18 folios bound together, not all from same source. Those marked (*) probably from same source as those marked in 11, and No. 12 :
*1. Friday Theot. conclusion.
2. Doxology on S. John Baptist.
3. (Reversed) Doxology on the Church.
4. Doxology on S. John Baptist.
*5. Hymn. ⲑⲁ ⲡⲓⲥⲑⲟⲓ ⲛⲟⲧⲣⲓ.
6. Sunday, Doxologies after the Theotokia.
7. (Reversed) Sunday Theotokia, end of S. III. and paraphrase.
8. (Connects with 3).
*9 Saturday Theotokia, V, VI, VII.
10. Saturday Theotokia, VII, VIII.
11. Doxology on St. John Baptist. (Vat. 38. 232-3.)
*12. *Psali* for Saturday (before the Theotokia).
*13-14. Latter part of Ode I. (Exod. 15) ;—*Psali* following this Ode.
15. Sunday Theotokia : paraphrase of I. (connects with p. 7.)
16. Sunday Theotokia : III.
17. Doxologies on B. V. Mary, II and II.
18. Concluding part of Saturday Theotokia.

14. *Theotokia*. 8 continuous pages, very late.
Thursday Theotokia IV-IX conclusion, *Tarh* (Arabic), *Psali* on Ode II.

15. *Theotokia*. 1 page. Saturday Theotokia I.

16. 10 pages from *Theotokia* (?) :
1. Litany from " Deacon's manual " sometimes attached to Theotokia.
2. Psalm 2. 2 to end.
3. Trisagion, etc. (very fragmentary).
4. Doxology for Easter (?).
5. Doxology for Easter (Cairo ed. p. 434).
6. } Fragments connected with preceding.
7. }
8. }
9. as Cairo edit. of Theotokia, p. 436.
10. as Cairo edit. of Theotokia, p. 434 :—also, as Vatican Borgia 38, fo. 214.

17. 1 page. *Theotokia*. Part of alternative *Psali* for Sunday.

18. 2 pages. *Psali* on Ode IV.

19. 1 page (late date) Tuesday Theotokia II., III.

20. 1 page. Part of alternative for Sunday *Psali*.

21. 1 page. Sunday Theotokia, paraphrase. Continuation of No. 11. page 6.

22. 1 page. Doxology for Feast of the Cross.

23. 2 pages. Sunday Theotokia VII.

24. 5 pages. *Psali* " on the fast "—in general character like Vatican Borgia 38., fo. 204, and Cairo printed Theotokia 71.

25. 1 page of alphabetical *Psali*—not identified.

26. Canticle. Scripture passages : 3 pages numbered 9, 10 11 : [page 14 in the exhibition gives beginning of similar ode for Nativity of Christ].

27. 6 pages, roughly written, modern. Extracts, prayers in frequent use, etc.

deL. O'L.

BIBLIOGRAPHY OF WORKS MENTIONED IN TEXT

ADAMETZ, L., *Herkunft und Wanderungen der Hamiten, Wien*, 1920.

ALLEN, A. H., *Commercial Organic Analysis*, London and York, Pa., Vol. XVII.

AMER, Mustafa, and O. Menghin. *See* MENGHIN.

ANTONIUS, O., *Grundzuge einer Stammesgeschichte der Haustiere*, 1920.

AYRTON, Edward, and W. L. S. Loat, *Predynastic Cemetery at El Mahasna*, London, 1911.

BECK, H. C., " Notes on Glazed Stones." *Ancient Egypt and the East*, Part II, Dec., 1934.
" Glass before 1500 B.C." *Ancient Egypt and the East*, Part I, June, 1934.
" The Classification and Nomenclature of Beads and Amulets." *Archæologia*, Vol. LXXVII, 1928.

BECKER, *Der Männliche Castrat*, Freiburg-i-B., 1898.

BÊNÉDITE, G., *The Journal of Egyptian Archeology*, Vol. V, Jan., 1918, Part I, p. 8.

BREASTED, James Henry, *The Oriental Institute*, The University of Chicago Survey, XII, Chicago, 1933.

BREUIL, Henri' et Leo Frobenius, *Afrique*, Paris, 1931.

BRUNTON, Guy, *Mustagedda* (in the Press).
Qau and Badari I, London, 1927.
Qau and Badari II, London, 1928.
" The Predynastic Town-Site at Hierakonpolis," *Studies Presented to F. Ll. Griffith*, London, 1932.
and G. Caton-Thompson, *Badarian Civilisation*, London, 1928.
and Reginald Engelbach, *Gurob*, London, 1917.
and W. M. Flinders Petrie. *See* PETRIE.

CAMERON, John, *The Skeleton of British Neolithic Man*, London, 1934.

CAPART, J., *Les Débuts de l'Art en Egypte*, Bruxelles, 1904.

CATON-THOMPSON, G., and E. W. Gardner, *The Desert Fayoum*, London, 1934.
and Guy Brunton. *See* BRUNTON.

CHUDEAU, R., et E. F. Gautier, *Missions au Sahara*, Paris, 1908–1909 (*passim*).

COFFIGNIER, *Bulletin de la Société Chimique de France*, 1909, V, 1101.

CONYBEARE, Edward, *Alfred in the Chroniclers*, London, 1900.

CORTIER, M., *D'une rive á l'autre du Sahara*, Paris, 1908.

DAVIES, N. de G., *Deir el Gebrawi I*, London, 1902.

ENGELBACH, Reginald, and Battiscombe Gunn, *Harageh*, London, 1923.
and Guy Brunton. *See* BRUNTON.

ERMAN, Adolf, *A Handbook of Egyptian Religion*, trans. by A. S. Griffith, London, 1907.

FLINT IMPLEMENTS, for bibliography of, see p.p. 251–253.

FRANCHET, L., *Céramique Primitive*, Paris, 1911.

FROBENIUS, Leo, and Henri Breuil. *See* BREUIL.

FOUREAU, Fernand, *Documents Scientifiques de la Mission Saharienne, Mission Foureau-Lamy I*, Paris, 1905.

GAILLARD and Lortet. *See* LORTET.

GARDNER, E. W., and G. Caton-Thompson. *See* CATON-THOMPSON.

GARSTANG, John, *Mahasna and Bet Khâlaf*, London, 1902.

GAUTIER, E. F., and R. Chudeau. *See* CHUDEAU.

GIMPERA, Pedro Bosch, *El Problema Etnológico Vasco y la Arqueologiá*, Publicación de la Sociedad de Estudios, Vascos, San Sebastian, 1923.

GREEN, F. W., and J. Quibell. *See* QUIBELL.

GRIFFITH, F. Ll., *Beni Hasan III*, London, 1896.

GUNN, Battiscombe, and Reginald Engelbach. *See* ENGELBACH.

HOBLEY, C. W., *Journal of the Society for the Preservation of the Fauna of the Empire*, Sept., 1934, p. 20.

HORNER, Leonard, " An Account of Some Recent Researches near Cairo," *Phil. Trans. Roy. Soc. of London*, CXLVIII (1858).

JUNKER, H., *Anzeiger der Akademie der Wissenschaften in Wien*, philosophist. Klasse Nr., XVI–XXVII, 1933, p. 88.

LAURIE, A. P., *Materials of the Painter's Craft*, " Arts and Crafts of the Nations," Capenny, London and Edinburgh, 1910.

LOAT, W. L. S., and Edward R. Ayrton. *See* AYRTON.

LORTET and Gaillard, *La Faune Momifiée de l'Ancienne Egypte ; Archives du Museum d'histoire naturelle de Lyon*, Vol. VIII, 1903.

LUCAS, A., *Ancient Egyptian Materials and Industries*, Second Edition, London, 1934.

MACDONALD, Eann, *Beth Pelet II*, London, 1923.

MAXWELL, Marius, *Stalking Big game with a Camera in Equatorial Africa*, London, 1925.

MENGHIN, O., and Mustafa Amer, *The Excavations of the Egyptian University in the Neolithic Site at Maadi*, 1st. Preliminary Report (season 1930–31), Cairo, 1932. Egyptian University Faculty of Arts Publ. No. 19.
2nd Preliminary Report (season 1932), Cairo, 1936.
and H. Junker, *Grabungen auf der Neolithischen Siedlung von Merimde Beni-Salame*. Anzeiger d. phil. hist. Klasse d. Akademie der Wissenschaften in Wien, Jahr, 1933.
Weltgeschichte der Steinzeit, Wien, 1931.

MÖBIUS, *Die Wirkungen der Kastraten*, Halle, 1906.

MOND, Sir Robert, and Oliver H. Myers, *The Bucheum*, London, 1934.

MONOD, Théodore, *L'Adrar Ahnet*, Travaux et Memoires de l'Institut d'Ethnologie-XIX, Paris, 1932.

MORANT, G. M., " A Study of Egyptian Craniology from Prehistoric to Roman Times." *Biometrica*, Vol. XVII, 1925.

MORGAN, J. de, *Recherches sur les Origines d'Egypte II*, Paris, 1896–97.

MYERS, Oliver H., and Sir Robert Mond. *See* MOND.

NEWBERRY, P. E., *Beni Hasan I*, London, 1893.
Egyptian Antiquities ; Scarabs, London, 1906.
Rekhmara, London, 1900.
Journal of Egyptian Archeology, Vol. XIV, Nov. 1928, pp. 211–225.

OSTWALD, Wilhelm, *Colour Science*, translated by J. Scott Taylor, London, 1931.
The Ostwald Colour Album, arranged by J. Scott Taylor, London, 1935.

PATON, David, *Animals of Ancient Egypt*, Princeton, 1925.

PEAKE, H. J. E., and H. J. Fleure, *Corridors of Time III*, Oxford 1927–36.

PEET, T. Eric, *Cemeteries of Abydos II*, London, 1914.

PETRIE, W. M. Flinders, *Arts and Crafts of Ancient Egypt, The*, Edinburgh and London, 1909.
Ancient Weights and Measures, London, 1926.
Buttons and Design Scarabs, London, 1925.
Decorative Patterns of the Ancient World, London, 1930.
Dendereh, London, 1900.
Gizeh and Rifeh, London, 1907.
Gurneh, London, 1909.
Inductive Metrology, London, 1877.
Measures and Weights, London, 1934.
Prehistoric Egypt, London, 1920.
Prehistoric Egypt Corpus, London, 1921.
Pyramids and Temples of Gizeh, London, 1883.
Scarabs and Cylinders, London, 1917.
Tools and Weapons, London, 1917.
and Guy Brunton, *Sedment I*, London, 1924.
and J. Quibell, *Naqada and Ballas*, London, 1896.

QUIBELL, J., and F. W. Green, *Hierakonpolis*, London, 1902.

RABOURDIN, L., " Les âges de pierre du Sahara central," *Bull. Soc. d'Anthropologie*, 3e, Série, Tome IV, Paris, 1881.
RANDALL-MACIVER, D., *El Amrah and Abydos*, London, 1902.
RANKE, *Die ägyptischen Personennamen*, Hamburg, 1933.
REISNER, G. A., *Kerma IV–V*, " Harvard African Studies," Vol. VI, Cambridge, Mass., 1923.
Mycerinus, Cambridge, Mass., 1931.
REUTTER, *Comptes Rendus des Séances de l'Academie des Sciences*, Paris, 1916 *162*, 421.

SMITH, G. Elliott-, *The Ancient Egyptians*, New York, 1911.
STEGMANN, F. P., *Das Rassengeschichte der Wirtschaftstiere*, 1924.
STOESSIGER, Brenda N., " A Study of the Badarian Crania." *Biometrica*, Vol. XIX, 1927.

THOMAS, " Recherches sur un atelier de silex taillés à Ouargla (Algerie)." *Materiaux pour l'histoire primitive et naturelle de l'Homme*, Tome XI, 1876.
TILHO, M. A. J., *Documents Scientifiques de la Mission Tilho*, 1906–1909, Paris, 1910–14.

JOURNALS, *etc.*
Dictionnaire d'Art et d'Archéologie, Paris, 1930.
Encyclopædia Britannica, XIth, Edn., Vol. XVII, " Maize."
Micro-chemical Methods Suitable for General Analytical Practice, Institute of Chemistry, London, 1934.
Journal of Egyptian Archeology, Vol. XIII, London, Oct., 1927, pp. 245–6.
Vol. XIV, London, Nov., 1928, Pl. XVIII.
Vol. XVII, London, Nov., 1931, pp. 223–232.
Vol. XIX, London, May, 1933, p. 55, Pl. XI.
La Géographie, Paris, 1921, p. 307.
L'Anthropologie, t.XLI, Paris, 1931.
Lockwoods Dictionary of Mechanical Engineering Terms, edited by J. G. Horner, London, 1902.
Manchester University Museum Handbook, No. 68, Manchester, 1910.
Mineralogical Magazine, Truro, 1929, Sept., Vol. XXII, No. 126, p. 147.

ABBREVIATIONS

A.	Ashmolean Museum, Oxford
a.	animal (decoration)
Ar.	Armant
Ar. X	Armant, found without associations
Anc. Eg. Mat. & Ind.	*Ancient Egyptian Materials and Industries*, A. Lucas
approx.	approximately.
Bad. Civ.	*Badarian Civilisation*, Brunton and Caton-Thompson
Baq. R.	Baqaria Roman village
Buch. X	Bucheum, found without associations
B.M.	British Museum (Department of Egyptian and Assyrian Antiquities unless otherwise stated)
B.	black
Bk.	black
brnshd.	burnished
Bead Register, abbreviations in, see foot of each page	
Body Attitudes, abbreviations in, see p. 10.	
c.	circa
°C.	degrees Centigrade
cc.	cubic centimetres
cm.	centimetres
C.	*Chaff-ware* (pottery), Child (Tomb register)
D.	*Desert-ware*
Δ	drawing
dec.	decoration
Dyns.	Dynasties
E.	East
E.N.E.	East-North-East
E.S.E.	East-South-East
E.P.II	Early Predynastic II
E.P.III	,, ,, III
E.P.IV	,, ,, IV
ex.	example
F.	Female
f.	floral
frag.	fragment
Φ	photograph
G.	*Grit-ware*
g.	geometric
gl.	glass
h.	human (decoration)
Hl.	horizontal
Ht.	height
I.	incised
inscr.	inscribed
Ins.	inside
Intr.	intrusive
I.C.E.P.	International Corpus of Egyptian Pottery
J.E.A.	*Journal of Egyptian Archæology*
L.P.	Late Predynastic
L. Egypt	Lower Egypt
L. Paleolithic	Lower Paleolithic
Lth.	length
>	larger than
Mid.	middle
M.E.	Middle Egyptian (or Middle Egypt)
M.P.	Middle Predynastic
m.	miscellaneous
M.	red and black (mixed), (Pottery) and male
mm.	millimetre
mgm.	milligram
N.	North and *Nile-ware* (Pottery), Not (Tomb register)
N.W.	North-west
N.E.	North-east
N. Egypt	North Egypt
N.E.D.	North-east Depth
N.E.H.	North-east Height
Osteology abbreviations, see pp. 145–149.	
outs.	outside
P.	painted (Pottery) and partially (Tomb register)
Ptol. Rom.	Ptolemaic to Roman
Pl.	plate

Pre. Egypt	*Prehistoric Egypt.* Petrie
Pre. Corpus	*Prehistoric Egypt Corpus.* Petrie
Pre.	Predynastic
Proto.	Protodynastic
Pottery register abbreviations, see footnotes	
Q.	quite (Tomb register) and The Queen's College, Oxford
R.	red or relief (Pottery)
R.C.S.	Royal College of Surgeons
(R–L)	right to left
r.i.	refractive index
S.	South
S.E.	South-east
S.W.	South-west
S.D.	sequence date
Shd.	sherd
Sp.	species
Sp. g.	specific gravity
<	smaller than
T.	Royal Ontario Museum of Archæology, Toronto
Th.	thick.
T.C.	terra Cotta
T.C.88	Amphora (pot type *The Bucheum III*, Pl. CXLVII et seq.)
Up. Egypt	Upper Egypt
Up. Acheulean	Upper Acheulean
U.E.	Upper Egyptian (or Upper Egypt)
U.C.L.	University College, Gower Street, London
Ve.	vertical
W.	West or Wellcome Historical Medica Museum
Wth.	width
wt.	weight

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CORRECTION.

Page 121, four lines from bottom, for " 10 cm." read " 9 cm." and page 122, third paragraph, second line, for " 19 cm. × 5·5 cm." read " 8·8 cm. × 5·7 cm."

CEMETERIES OF ARMANT I—TEXT